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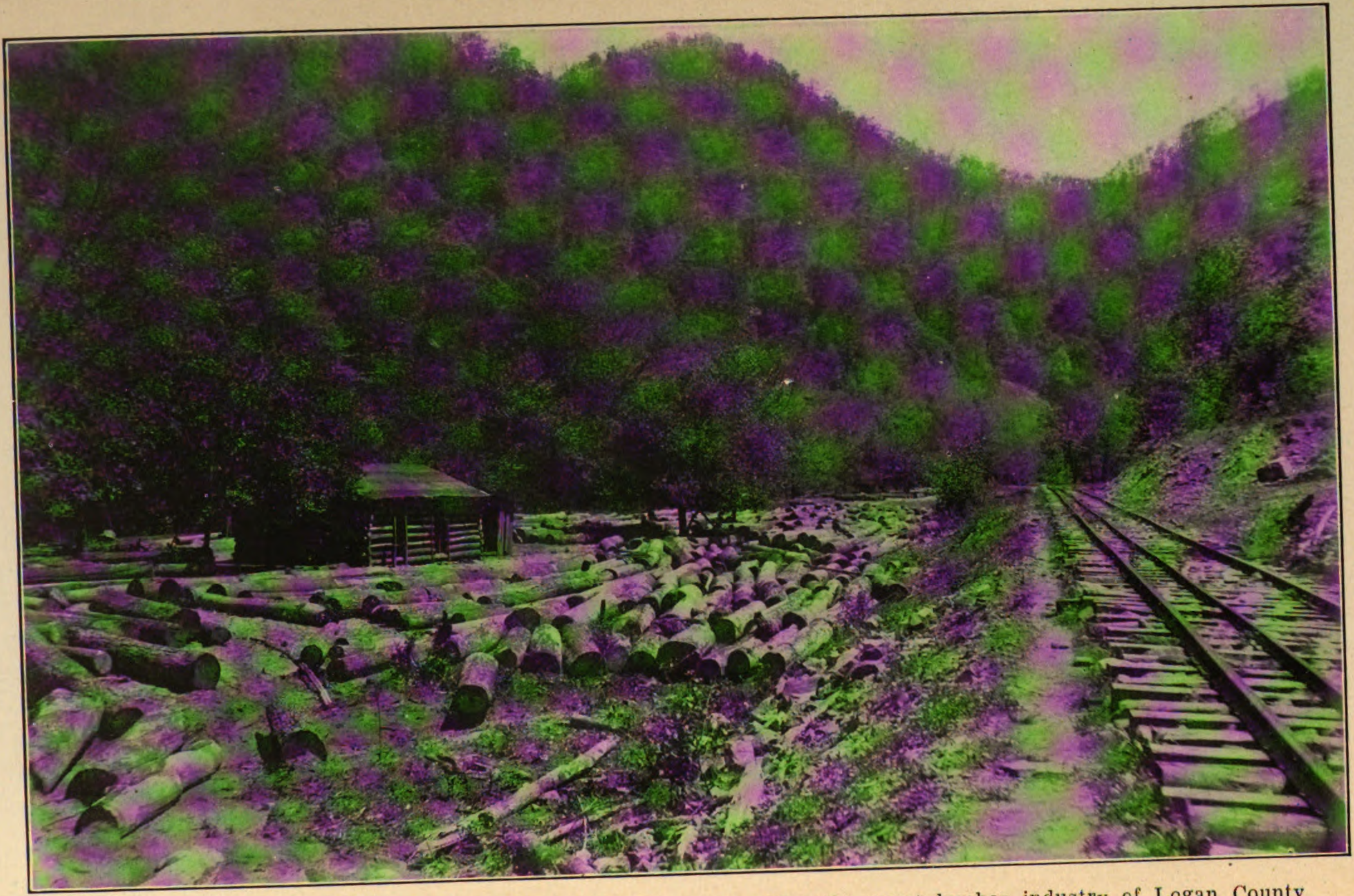

PLATE I.—View near Sharples of one of many scenes accompanying the great lumber industry of Logan County
Courtesy of J. C. Blair.

WEST VIRGINIA

GEOLOGICAL SURVEY

JUNE 20 1863

Logan and Mingo Counties

By

RAY V. HENNEN, Assistant Geologist

and

DAVID B. REGER, Assistant Geologist

Part IV—Paleontology, by W. ARMSTRONG PRICE
Paleontologist.

I. C. WHITE, State Geologist.

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LETTER OF TRANSMITTAL.

To His Excellency, Hon. Henry D. Hatfield, Governor of West Virginia, and President of the West Virginia Geological Survey Commission:

SIR:

I have the honor to transmit herewith the Detailed Report with accompanying geologic and structural maps of the counties of Logan and Mingo. This Report is the joint work of Assistants Ray V. Hennen and D. B. Reger, the part performed by each being duly stated in the Authors' Preface over their signatures. The topographic map of Logan and Mingo also accompanying this Report was compiled from the several quadrangle sheets already published through cooperation of the West Virginia Geological Survey with that of the Topographic Branch of the U. S. Geological Survey, and the same has been used as the base of the geologic map herein transmitted. The soil map and Report on these two counties, prepared in cooperation with the U. S. Bureau of Soils, could not be published as an integral portion of this Report without delaying the volume several months, and hence it will be mailed out separately when published, since through the terms of a contract with the Public Printer 2,500 extra copies of the Soil Report and Soil Map of the Logan and Mingo area will be furnished the West Virginia Geological Survey at a saving of about $200 in cost over that of republication of both in the present volume. This plan will probably be pursued in most cases hereafter, since it avoids delay of issue of the Detailed County Reports, some of which have hitherto been held up for two to three months awaiting the completion of the Government Soil Report and Maps.

The present volume covers in great detail a very rich coal region and the many new coal openings made in recent years, as well as the accurate topographic maps, and levels now available, have enabled the skilful authors of this Report to clear up and correct many doubtful correlations heretofore made in the preliminary and general publications (Volumes

II and II-A) on the coals of the State as a whole, and also to describe and name many members of our great Coal Measure Series not hitherto dignified with distinct names. Some of the correlations of the authors, like that of the celebrated **Island Creek Coal,** with the **Cedar Grove Coal** of the Kanawha Valley instead of with the **Campbell Creek or No. 2 Gas Coal,** with which the writer had provisionally identified the same, may appear rather revolutionary to the mining engineers who have become accustomed to regard the **Island Creek bed** as the **"No. 2 Gas" seam,** but if the authors have correctly traced the **Dingess Limestone** horizon between the Kanawha and Tug Rivers, there would appear to be no escape from their conclusion as to this identity. Another surprising result of these careful and detailed studies is that the splendid coal mined in the vicinity of Clothier along the Logan-Boone Line turns out to be a representative of the **Chilton Coal** of Kanawha County, a bed which everywhere in the latter area, so far as known, is impure and practically of no value for commercial purposes. This Clothier or Chilton bed, as determined by Hennen and Reger, comes about 400 feet vertically above the horizon of the **No. 2 Gas Coal** at Clothier, with which many had erroneously supposed it to be identical. The excellent coal mined along Dingess Run, near Logan, is also made up of a portion of the same Chilton bed according to these correlations. The economic importance of correctly tracing and identifying the several coal beds from one county to another is very great, since otherwise some of our most valuable coal horizons might be overlooked in the purchase or sale of coal lands, and in all estimates of the tonnage of coal lands for taxation or other purposes. Hence it is absolutely necessary to know what coal beds underlie any region in order to get just estimates of land values therein. In thus bringing order out of much previous confusion, the authors were greatly aided by the fossiliferous **Eagle Limestone and Shales,** and by the newly discovered fossiliferous **Dingess Limestone,** several hundred feet higher, as well as with other fossiliferous zones discovered, thus demonstrating the practical value of the paleontologic studies recently inaugurated by the Survey under the supervision of Dr. Price. With one conclusion of the authors, the writer has not been able fully to agree; viz, that the excellent coal mined on Buffalo Creek below Williamson in Mingo County is a new element in the series rather than the old and well known **Coalburg** or even **Winifrede** bed of the Kanawha Series, with which the writer thought it might be identical as given in Volume II(A), pages 309-310. This latter identification would appear to be sustained by the **fossiliferous limestone** occurring 75-80 feet below, since it would correlate with the fossiliferous **Winifrede Limestone** described on page 431, Volume II(A), by the writer, coming 67 feet under the **Winifrede Coal** at the town of Winifrede, Kanawha County, the type locality for both coal and limestone of that name. It is possible that future work may clear up this doubt as to the true place of this **Buffalo Creek Coal,** since the authors admit they are not entirely satisfied with their present conclusions thereon.

To some of the readers of this Report, it may appear that the still lower coal beds of McDowell County and especially those of southern Logan and Mingo which dip successively below water level ought to exist under the central portion of Mingo and Logan Counties, but in this the results of drill holes appear to give but little encouragement, as may be illustrated by the record of a bore hole put down by the Crystal Block Coal and Coke Co. in the Hatfield Bend of Tug River, Mingo County, and kindly given the Survey by Mr. H. N. Eavenson, Chief Engineer of the U. S. Coal and Coke Co., of Gary, W. Va. This well begins about 165 feet below the horizon of the Alma Coal, and its log is reported as follows, the identifications in parentheses being those of Assistant Hennen:

Hatfield Bend Drill Hole Record.

Near Hatfield Tunnel, Mingo County; elevation of top of well, 707′ A. T.; elevation of Alma Coal, approximately 870′ A. T.

	Thickness Feet.	Total Feet.
Loose material	37	37
Sandstone	12	49
Black slate (Stockton shale)	40	89
Sandstone (Eagle)	46	135
Black slate	20	155
Sandstone	3	158
Gray slate	10	168

	Thickness Feet.	Total Feet.
Sandstone	4	172
Blue slate	18	190
Gray slate	60	250
Dark gray slate	15	265
Gray slate	35	300
Black slate (Eagle shale)	8	308
Gray slate	17	325
Gray sandstone (Lower War Eagle and Upper Gilbert)	105	430
Slate	40	470
Sandstone	30	500

The well was drilled with churn drill, but was very carefully watched for any traces of coal. It penetrates the horizon of the Eagle as well as two or three other important coal beds described in this Report, but not a trace of coal is reported in the entire 500 feet, all of which would appear to belong in the Kanawha Series, since the great 105 feet of sandstone near the bottom of the bore hole is identified as the Upper Gilbert by Hennen and it comes just above the base of the Kanawha or Upper Pottsville group.

This record as well as many more in other portions of the West Virginia coal fields illustrates the fact long ago announced by the writer that our several great coal beds were accumulated as bordering belts or fringes of comparatively narrow width (20 to 30 miles) around the margin of an embayment of the sea whose central and deeper portion coincides roughly with the great geosyncline down and just west from which the Ohio River flows from New Martinsville to Kenova, and along which on either side for many miles both in West Virginia and Ohio, no coal of economic importance was ever deposited in any of the coal series, the oldest and lowest coals thinning away first toward this central basin, and the higher beds extending successively farther and farther into this central barren area so that the New River beds of West Virginia extend farther westward than those of the underlying Pocahontas group, but the coals of both have already disappeared as commercial possibilities before reaching even the extreme south-eastern boundaries of Logan and Mingo. They are succeeded above by the Kanawha Coals, which in turn practically disappear and thin away before the north-western border of Mingo County is reached, where the coals of the next higher or Allegheny Series make their appearance in southern Wayne only to disappear in central Wayne and Cabell like their predecessors with only sporadic patches of very thin beds in the Conemaugh and Monongahela Series reaching to the central basin where practically all of the underlying coal horizons of McDowell, Logan, Mingo and southern Wayne, so rich in fuel to the southward, are now in northern Wayne and Cabell either not represented even in the rock series or else are practically destitute of any coal of commercial value. This broad belt practically barren of commercial coal in most of the series and extending through the central basin of the Appalachian Coal Field from Pennsylvania across West Virginia and on into Kentucky, should lead every thinking man to prize more highly the great deposits of fuel that occur in these more southern counties of the State, like Logan, Mingo, and McDowell, and to lend his influence to prevent the unnecessary waste and destruction of this most valuable heritage of the State through unskilful and improper mining developments either for coal, or for oil and gas.

I. C. WHITE, *State Geologist.*

Morgantown, W. Va., January 15, 1915.

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AUTHORS' PREFACE.

This book contains a short historical and industrial sketch, a chapter on Physiography, and a chapter on Paleontology by Dr. Wm. Armstrong Price, and a description of the Mineral Resources of the Counties of Logan and Mingo.

In order to describe the several coals in their proper stratigraphic sequence, it was necessary to make an exhaustive study of the entire rock system and to embody a large part of this study in the text in the form of geological sections and detailed descriptions. This matter may not be of interest to the general reader, but its value to professional men conducting future coal developments in the two counties can not be questioned. This study of the rocks has led to their representation on Map II by means of structure contours based on the bottom of the Campbell Creek (No. 2 Gas) Coal, which is the most extensive seam and most conveniently located in the rock column for accurate structural work.

Two maps accompany the Report in a separate atlas. Map I shows Topography, and Map II shows General and Economic Geology. Besides these separate Maps, 23 Figures are embodied in the book.

Figures 5 to 22, inclusive, published in the text, are intended to show, at a glance, where the several coal seams are of minable thickness and purity. Since some of these coals are too thin or impure to be minable in certain regions, it has been necessary in many of the figures to establish arbitrary lines showing the disappearance of the coals in these localities where they are known or believed not to exist in minable quantity. In referring to these figures, it must be remembered that there are probably small areas of good coal just across the line where no coal is indicated and probably numerous patches within the shaded sections where the coal is too thin or impure to be minable. Such a representation can show only the **approximate line of disappearance,** and in regions where there is

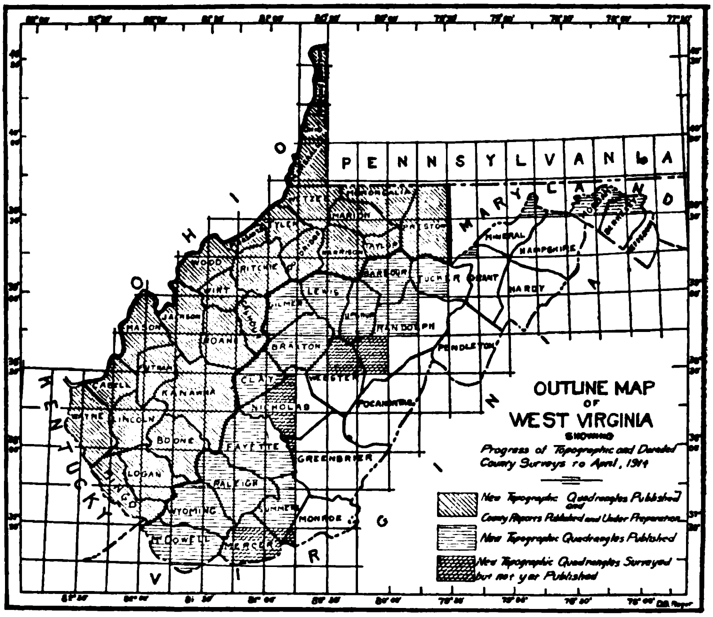
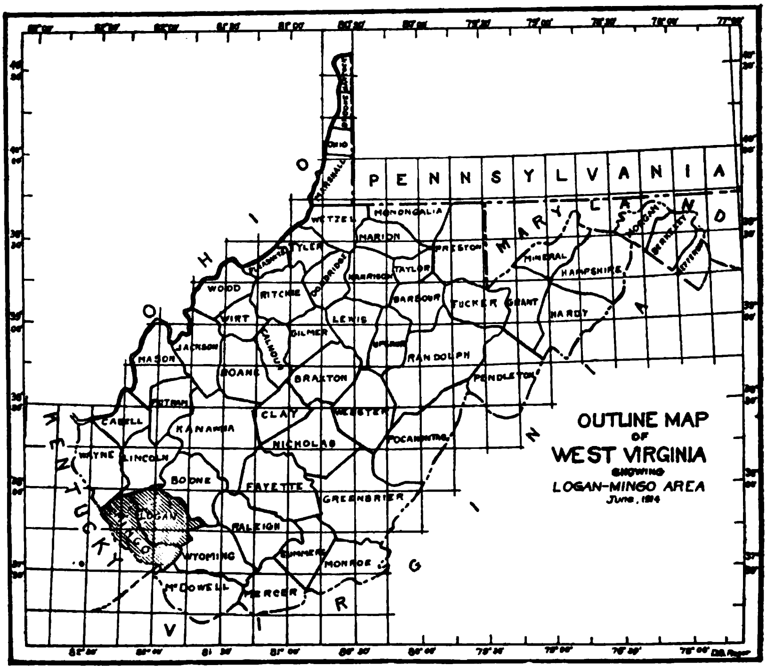


Figure 1. See explanation on figure.



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doubt, the detailed sections of coal openings listed on Map II and published in the text should be consulted for the character of the coal.

Numerous coal openings have been described in Chapter VIII, numbered consecutively from 1 to 885, and the numbers have been placed on Map II, along with the mine symbols. The description of any opening may be found in the text by referring to the heading "Mines, Coal, by Numbers" in the Index, where all these openings are classified in numerical order.

The authors, in company with R. M. Gawthrop, a competent Field Assistant, spent the season of 1913 in making the necessary researches for writing the Report, and the winter of 1913-1914 was mostly spent in assembling the data into intelligent form.

Mr. Hennen, the senior geologist, who spent part of the winter completing another Report, is the author of Chapters VI and VII. Mr. Reger prepared the structure contours on Map II and is the author of Chapters I to V, inclusive, and Chapters VIII and IX. Throughout the entire work there was a constant interchange of ideas, so that there is a dual responsibility for the whole Report, including the Maps. Mr. Gawthrop assisted throughout the office work, doing all the drafting and assembling of tabular matter, as well as relieving the authors of much of the tedious routine work of compiling sections and well records.

Part IV, treating of the Paleontology, is the exclusive work of Dr. W. Armstrong Price, Paleontologist, who made the necessary collections in the field, examined the fossil specimens and described them.

The chemical analyses and calorific tests, except some which have been taken from former Reports of the Survey, were made by J. Berghius Krak, Assistant Chemist, working under the direction and with the assistance of B. H. Hite, Chief Chemist.

Special mention is here made of the hearty manner in which many mining engineers, mine managers and superintendents, oil and gas operators, and other professional and business men of the two counties cooperated in furnishing valuable maps, well records, coal test borings, and miscellaneous information, secured at private expense, without the use of which much of the data published in this Report would be forever denied the general public. Credit for all such material furnished is given in the text.

Finally, the authors join in expressing their obligation to Dr. I. C. White, State Geologist, for his careful supervision and valuable suggestions throughout the work of writing the Report.

RAY V. HENNEN,
DAVID B. REGER.

Morgantown, W. Va., June 20, 1914.

ERRATA.

Page 32, line 9 from bottom, for **the anticline** read **this anticline.**

Page 49, line 17 from bottom, for **(290')** read **(479').**

Page 76, line 13 from bottom, for **95** read **5.**

Page 78, line 13 from bottom, for **hsale** read **shale.**

Page 152, line 4 from bottom, for **Shale, gray** read **Coal.**

Page 307, insert the following line above line 3: **Logan District, on Dingess Run, just above Rockcamp Branch, 2.3.**

PART I.

History and Physiography.

CHAPTER I.

HISTORICAL AND INDUSTRIAL DEVELOPMENT.

LOCATION.

Logan and Mingo Counties, comprising the area treated in this Report, are situated in the extreme southwestern part of West Virginia, being entirely included within the parallels of 38° 02′ and 37° 31′ North latitude, and 81° 36′ and 82° 26′ West longitude from Greenwich. Logan, the more northern of the two counties, is bounded on the north by Lincoln and Boone Counties, on the east by Boone and Wyoming Counties, on the south by Wyoming and Mingo Counties, and on the west by Mingo County. Mingo, the more southern of the two counties, is bounded on the north by Wayne, Lincoln and Logan, on the east by Logan, Wyoming and McDowell Counties, on the south by McDowell, Buchanan County, Virginia, and Pike and Martin Counties, Kentucky, and on the west by Martin County, Kentucky, and Wayne County.

The geographic position of these two counties may be observed in detail from Maps I, II, and III which accompany this report in a separate atlas.

TRANSPORTATION.

Water Ways.

Guyandot River.—The Guyandot River, which flows in a northwesterly direction entirely across Logan County and is tributary to the Ohio at Huntington, has been used as a means of transportation only for log rafts and flat push boats. While the current is not swift, the water is too shallow for navigation by steam or gasoline boats. Before the Chesapeake and Ohio Railroad was built into Logan County, the river was a great factor in the economic life of the people since it was the only outlet for the vast forest that once existed along its course. It could be used for transporting logs only at the flood stage since, at ordinary times, the volume and current of the stream are not sufficient to carry them. The use of this river for the transportation of freight into Logan County from the Ohio Valley in push boats has never been great owing to the shallowness of the stream. Since the railroad was built, the Guyandot River has been almost entirely abandoned as a means of transportation. It is extremely doubtful whether traffic through locks and dams would ever justify their construction along its course.

Tug Fork of Big Sandy River.—The Tug Fork is similar in character to the Guyandot and flows in a northwesterly direction along the southwestern border of Mingo County, and forms the line between West Virginia and Kentucky, uniting with the Levisa Fork at Louisa to form the Big Sandy River, the latter being tributary to the Ohio at Kenova. It has been used, at flood stage, for transporting log rafts to the Ohio River, and, under favorable conditions, for transporting merchandise in push boats from the Ohio Valley into Wayne and Mingo Counties and into the adjoining regions of Kentucky. Like the Guyandot, its use as a transporting agency closed almost entirely when the Norfolk and Western railroad was built along its course. A system of locks and dams which has been planned and partly constructed by the U. S. Government along its lower course in Wayne County has been described in a previous report of this Survey.[1] While the Tug Fork above Louisa is usually deeper than the Guyandot, owing to its more restricted banks, yet the current is swifter, making navigation for boats just as difficult as on the Guyandot, so that any attempt to make it navigable through Mingo County would prove an economic failure.

Steam Railroads.

Norfolk and Western Railroad.—The Norfolk and Western, which was the first railroad to be built into either of the two counties, is the chief artery of traffic in Mingo County. Construction of the road from Elkhorn, W. Va., to Coal Grove, Ohio, was begun in March, 1890, and completed November 1, 1892. As originally built, the line follows the north side of the Tug Fork of Big Sandy River, with the exception of a short tunnel through Kentucky at Sprigg, from the McDowell County Line to Naugatuck at the mouth of Pigeon Creek, a distance of 51.6 miles. The line is double tracked from Devon to Naugatuck. From Naugatuck the road was built northward to Dingess and from Dingess northwestward down Twelvepole Creek to Kenova, Wayne County, the distance from Naugatuck to the Mingo-Wayne County Line being 26.3 miles.

From Naugatuck a short line, opened for traffic December 15, 1904, was built down the Tug Fork of Big Sandy River through Mingo and Wayne Counties to a connection with the old line at Kenova. The distance from Naugatuck to the Wayne County Line, west of Kermit, is 6.2 miles. The new line is used for heavy traffic both east and west bound, while the old line through Dingess tunnel is used mostly for hauling empty east bound freight cars.

Chesapeake and Ohio Railroad.—Branch lines of the Chesapeake and Ohio Railroad handle the freight and passenger traffic of Logan County. The **Guyandot and Buffalo Creek Branch,** built to Logan in 1904 and completed to Craneco in February, 1912, taps the main line at Barboursville, the distance from Barboursville to Craneco being 90 miles, of which

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[1] C. E. Krebs, Cabell-Wayne-Lincoln Report, W. Va. Geol. Survey, p. 3; 1913.

40 miles are in Logan County. The **Holden Branch** extends from Logan westward up Copperas Mine Fork of Island Creek, a distance of 5.2 miles. The **Dingess Run Branch,** completed in February, 1912, extends 5.6 miles northeastward from Stollings on the Guyandot River to the forks of Dingess Run east of Ethel. The **Rum Creek Branch,** completed in October, 1912, extends from Rolfe, on the Guyandot River, eastward to Slagle, a distance of 7 miles. The **Logan and Southern Railway,** completed under the supervision of the Chesapeake and Ohio Railroad December 1, 1913, extends from Monitor Junction southward up Island Creek, a distance of 8.4 miles to the mouth of Cow Creek. Further extension of this road up the several branches of Island Creek has already been planned.

The Coal River Branch of the Chesapeake and Ohio Railroad, built in 1905, extends from the main line at Saint Albans southward through Kanawha and Boone Counties to Clothier at the Boone-Logan County Line, a distance of 51 miles. The **Spruce Fork extension** of this branch, completed in June, 1913, extends from Clothier southward up Spruce Fork, a distance of 11 miles. At its nearest point this extension is only 3 miles from the terminus of the Rum Creek Branch of the Guyandot Valley lines, but an expensive tunnel through the Guyandot-Coal River watershed would be needed to give the Clothier region direct connection with the Guyandot Valley at Logan.

Coal and Lumber Railroads.—In both Logan and Mingo Counties, there are numerous short branches, all of standard gauge and built solely for delivering coal, that make important feeders for the two principal systems and add materially to the total railroad mileage. These branches are all shown on Maps I, II, and III.

Numerous lumber railroads, both standard and narrow gauge, have been built in both counties. Most of them are of only temporary construction, built to remain in place while their tributary territory is being timbered. In Logan County there is at present a narrow gauge road on Buffalo Creek, tributary to the Guyandot River at Henlawson. Another is located in the Holden region with branches up Whitman

Creek and Lower Dempsey Branch of Mud Fork, having connection with the mill at Holden by means of a third rail laid between the Chesapeake and Ohio rails to give the proper narrow gauge. Another lumber railroad, of standard gauge construction, is in operation on the head of Buffalo Creek east of Craneco in the extreme eastern part of the county.

In Mingo County a narrow gauge road is in operation on Right Fork of Laurel Fork of Pigeon Creek, tributary to the Norfolk and Western at Rapp. Another narrow gauge road is in operation on Spruce Fork of the Left Fork of Laurel, connecting with the Norfolk and Western at the mouth of the Fork, one-half mile north of Rapp.

Lack of Communication Between Logan and Mingo.—Since Logan and Mingo Counties are served by two entirely different railroad systems, as explained above, communication between them by rail is possible only at Kenova, Wayne County, where the Norfolk and Western crosses the Chesapeake and Ohio Railroad. The lack of direct connection between the two counties makes trade between them difficult and expensive. The high range of hills that separates the drainage of the Guyandot River from that of Twelvepole Creek and Tug Fork of Big Sandy River forms a natural physical barrier that is responsible for the lack of convenient means of intercourse between the two counties.

Highways.

The highways of Logan and Mingo Counties consist of unimproved dirt roads and trails. No macadamized turnpikes have ever been built in either county. The soil in both counties being sandy, the roads do not become muddy, but most of them are steep and narrow, making travel by vehicles difficult and often dangerous. Many large areas are without wagon roads of any kind, the only means of communication being by mule and foot trails. The lack of bridges across the larger streams frequently makes travel of any kind impossible during the winter months. The total road mileage of Logan County, as reported by State Road Engineer A. D. Williams is 200 miles, and that of Mingo is 325 miles.

GENERAL DESCRIPTION.

Logan County.

Miscellaneous Items.

Formation.—Lewis[2] gives the following account of the formation and original boundaries of Logan County:

> "Logan County was created by act of Assembly, passed January 12, 1824, from parts of Giles, Tazewell, Cabell and Kanawha, and derived its name from Logan, the famous Mingo chief. The original boundaries were: 'Beginning at the junction of White Oak Mountain and New River, proceeding with the meanderings thereof until it meets the line of Kanawha County; thence with the lines thereof taking the dividing ridge between the Big and Little Cole Rivers, until it comes on a line with the head of Rock Creek; thence down the same to its mouth; thence crossing Little Cole, proceeding with the dividing ridge between Turtle and Horse Creek to the head of Ugly Creek; thence down the same to its mouth, crossing the Guyandotte, in a straight line to the mouth of Marrowbone Creek; thence up the Tug Fork of Big Sandy River to the mouth of Elkhorn Creek; thence proceeding with the dividing ridge between Elkhorn Creek and the Tug Fork, and so on a line with the Flat-Top Mountains to the beginning.'
>
> "The commissioners, named in the act to locate the seat of justice for the county, were William Buffington, of Cabell; William Thompson, Jr., of Tazewell; Charles Hale, of Giles; Samuel Shrewsbury, of Kanawha, and Conrad Peters and John Taylor, of Montgomery. They performed the work, and the village of Lawnsville or Logan Court House. was laid out in 1827."

The first house on the present site of Logan was built by John Dingess, one of three brothers who came from Europe to Mercer County and later to the Guyandot Valley. Riley Dingess settled at the mouth of Island Creek, opposite Logan, and Peter Dingess, the third brother, built his cabin at the mouth of Peach Creek, two miles north of Logan. The fourth settler in this region was James White, who located at the present site of Pecks Mill, and the fifth was Garland Conley, who made his home at the mouth of Buffalo Creek, where the lumber town of Henlawson now stands. The dates of these settlements are not available.

Area.—The present area of Logan County, considerably reduced from the original boundaries given above by the subsequent formation of Mingo, and as determined by planimeter from the topographic sheets of the United States Geological Survey, is as follows:

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[2] V. A. Lewis, History of W. Va., p. 656; 1889.

Districts	Square Miles.
Chapmanville	88.61
Logan	246.76
Triadelphia	120.45
Total for county	455.82

Relief.—The surface of Logan County varies from 600′ above sea level at Big Creek on the Guyandqt River at the Lincoln Line to 2750′ at the corner of Logan, Boone and Wyoming Counties. There is therefore a difference of 2150′, or slightly less than half a mile, between the two extremes. No mountain system passes through the county, the difference of elevation between the eastern and western parts being the result of a gradual rise of both the valleys and the summits toward the southeast. The hills range in height from about 500 feet along the Lincoln County Line to 1200 feet or more in the region southeast from Logan.

Population.—The following table, taken from the U. S. Census returns for 1910, shows the population of Logan County by magisterial districts for the last three enumerations:

Population of Logan County.

Districts	1910	1900	1890
Chapmanville District	3,606	2,531	2 000
Logan District, including Logan City	9,614	3,272	2,746
Logan City	1,640	444	....
Triadelphia District	1,256	1,152	1,524
Totals for County	14,476	6,955	6,270

The above figures show that the population of the county has increased abnormally during the last decade, due to the great increase of coal mining during that period. The percentage of increase from 1890 to 1900 was 10.9 per cent., but from 1900 to 1910 it was 108 per cent. This growth during the last ten years is much greater than that of the state or nation, the increase for West Virginia during the same period being 27.4 per cent., while that for the entire United States was 21 per cent. In 1910 the density of population for Logan County was 31.9 inhabitants per square mile. In the same year, the density for West Virginia was 49.9, while for continental United States it was 30.4. The entire population of Logan County is classed as rural, there being no town within its boundaries with 2500 or more inhabitants.

Products.—The principal animal products of Logan County are hogs, poultry, cattle, horses and mules, and dairy products.

The principal vegetable products are timber, corn, potatoes, apples and sweet potatoes.

The principal mineral products are coal and natural gas. There is little manufacturing industry in the county, but there is stone that would make a fair quality of building material and shale that would make good brick for building or paving purposes. Hydro-electric power could be developed on some of the larger streams.

The food products of the county do not supply the local demand. Truck farming would be a profitable industry in all the mining communities.

Property Valuation.—The State Auditor gives the following property valuation for Logan County for the two years ending with 1912:

	1911	1912
Real Estate	$ 9,181,360	$ 9,627,656
Personal Property	1,894 356	2,328,592
Totals	$11,075,716	$11,956,248

According to the above figures, Logan County ranks twenty-first in the state in point of wealth.

Towns and Industries.

Logan.—Logan is the only incorporated city in Logan County. It is situated on the Guyandot River at the mouth of Island Creek. From 1827, when the town was first established, until 1904, when the Chesapeake and Ohio Railroad was built into the county, the growth of Logan was insignificant, the population in 1900 being only 414. Since the completion of the railroad, however, the population increased so rapidly that in 1907 Logan was incorporated as a city and by the U. S. Census of 1910 had a population of 1640, or nearly four times as great as that reported for 1900. The development of the coal mining industry, made possible by the completion of the railroad, has been directly responsible for the rapid growth of Logan. There are no manufacturing concerns of any kind, but the natural location is such that the town will always be the metropolis of the county since a large part of the coal mined within its borders must first be assembled in the Logan yards before transportation to market. The various coal mines surrounding Logan will be described in Chapter VIII of this report.

The **Chesapeake and Ohio Railroad** maintains extensive shops at Logan for general repairs to rolling stock. Employment is given to a large number of skilled mechanics.

Logan is the county seat of Logan County and as such possesses the business arising from the courts and the various county offices. The court house is a handsome structure of native sandstone. Several wholesale supply houses, located in Logan, serve the surrounding towns.

Holden.—Holden, the second town of Logan County in point of commercial importance, is located on Copperas Mine Fork of Island Creek, four miles west of Logan, and is served by a branch of the Chesapeake and Ohio Railroad. The town, which is reported by the postmaster to have a population of 600 persons in 1913, is not incorporated. The population, as reported, evidently includes only the territory immediately surrounding Holden station, as the total mining population is much greater than 600. Its existence is due to the lumber and mining industries developed since the building of the railroad in 1904. The mines which are in operation here will be described in Chapter VIII. Holden is perhaps the best example of a model coal and lumber town in the entire State. It is well planned and well built, with comfortable homes for the employees who have families and commodious club houses for the unmarried men. A modern artificial water purification system and a theatre building add materially to the health and comfort of the community.

The **United States Coal and Oil Company,** which operates the mines, has had in operation a large band saw mill at Holden, which draws its supply of logs from the surrounding country. The mill was destroyed by fire in 1913 but is being rebuilt.

Ethel.—The town of Ethel, located on Dingess Run, 4½ miles northeast of Logan, and served by a branch of the Chesapeake and Ohio Railroad, is another important coal mining town. The postmaster reports its population as 2000 persons in 1913, but the estimate evidently includes much of the surrounding territory, as it seems too large. The town is not incorporated. Its size and importance are due entirely to the coal mining plants that surround it and that will be described in Chapter VIII.

Clothier.—The town of Clothier, located on Spruce Fork of Little Coal River and lying partly in Logan and partly in Boone County, is another important industrial center. It is served by the Coal River Branch of the Chesapeake and Ohio Railroad. The population, as reported for 1913 by the postmaster, is 1000. Like the other towns of Logan County, already described, its prosperity is due largely to the coal mining industry.

The **Boone Timber Company,** which is partly responsible for the industrial growth of Clothier, operates a large band saw mill on the Boone County side of the line.

The **Spruce Fork Power Company** operates a large electric plant at Sharples, two miles southward from Clothier. Coal for the plant is supplied from a mine in the hillside above it. According to information supplied to Hennen, the equipment consists of 2 six-hundred horsepower engines and another one of 1000 horsepower is being installed. The plant now sends 3300 volts, alternating current, to motor generating sets which generate 250 and 500 volts, direct current. When fully equipped, the plant will send 6600 volts, alternating current, and will supply power for running machinery at all the mines on Spruce Fork south of Sharples.

Chapmanville.—Chapmanville, located on the Guyandot River along the Chesapeake and Ohio Railroad, 11 miles northwest of Logan by rail, is the largest town in the county north of Logan. Besides supplying a considerable rural population, it is the center of a large natural gas field.

The **Castle Brook Carbon Black Company,** of Williams-port, Pa., operates a plant at Chapmanville for the manufacture of gas carbon black. According to Geo. L. Bubb, assistant secretary of the company, the plant was established in 1911, and has a daily capacity of 3000 pounds, natural gas from the surrounding region being used. Five men are employed, with a monthly payroll of $500, and the plant is in operation 12 months in the year.

Villages.—The following table gives a list of the smaller towns and villages of Logan County, with their respective populations. Small settlements, containing only a few persons, are not given. Those which are mining towns are given in black face type:

Population of Villages in Logan County.

Village	Population	Village	Population
Accoville	500 (E)	**Monitor**	400 (E)
Amherstdale	200 (E)	Pecks Mill	25 (E)
Big Creek	200 (E)	**Seng**	110 (R)
Craneco	350 (E)	**Sharples**	100 (E)
Dobra	100 (E)	**Sherman**	100 (E)
Henlawson	100 (E)	**Sovereign**	100 (E)
Hughey	79 (R)	Stollings	150 (E)
Kitchen	70 (R)	**Stone Branch**	200 (E)
Man	400 (E)	**Whitman**	300 (E)
Manbar	700 (E)		

E.—Estimate by postmaster or other reliable person, in 1913.
R.—Rand-McNally Shippers' Guide, population for 1910.

Mingo County.

Miscellaneous Items.

Formation.—Mingo County, which was formerly a part of Logan, was created a separate county by an act of the West Virginia Legislature, passed January 23, 1895, as follows:

> "So much of the county of Logan as is included within the following boundary lines, to-wit: Beginning on the Tug Fork of Sandy River where the county line of said county of Logan and the county of Wayne of said State of West Virginia intersects the state line between the states of West Virginia and Kentucky, and thence in a northerly direction with the county line of said counties of Logan and Wayne to where the line of the county of Lincoln of said State of West Virginia intersects said line; and thence in a northerly direction, with the county line of said counties of Logan and Lincoln to where said

line crosses the ridge between the waters of the Left Fork of Twelvepole Creek and the waters of the Guyandotte River, and thence, in an easterly direction with said dividing ridge around the heads of the left fork and right fork of Twelvepole Creek; continuing with said ridge and connecting with the ridge that divides the waters of Twelvepole and the waters of Island Creek; and continuing with said ridge in a southerly direction to where it unites with the ridge between the waters of Island Creek and the waters of Pigeon Creek; and continuing with the ridge between the waters of Island Creek and the waters of Pigeon Creek to heads of said creeks, where said dividing ridge unites with the ridge between the waters of main Island Creek and the waters of the Horse Pen Fork of Gilbert's Creek; thence, in a northerly direction with the ridge between the waters of the Horse Pen Fork of Gilbert's Creek on the one side and the waters of Island Creek, Rich Creek and Rockhouse Creek on the other side, to the head or upper end of the ridge between the waters of Rockhouse Creek and Sand Lick Branch and the waters of Silvery Branch; thence, down the ridge to the head of the ridge between Deep Ford Branch and Laurel Branch; thence, down said ridge, to Guyandotte River; thence, crossing said river where the lower point of the ridge on the lower side of Spice Creek comes to the river; thence, leaving the river and up said ridge on the lower side of Spice Creek to where it intersects the ridge between Spice Creek and Leatherwood Creek, and thence up and along said dividing ridge, to the county line between the counties of Logan and Wyoming; and thence, with said county line in a southerly direction, to where said county line intersects the county line between the counties of Logan and McDowell; and thence, with said county line of Logan and McDowell, to the state line between the states of West Virginia and Virginia; the same being the Tug Fork of Sandy River; thence, down the Tug Fork of Sandy River, the same being the county line of Logan County, to the beginning—shall form one distinct and new county, which shall be called and named by the name of Mingo County."

Mingo County, as thus formed, is the youngest in the state. Its partition from the present county of Logan was caused by the lack of adequate means of communication between the Tug Fork region and the Guyandot Valley. The new county, except a small portion in the extreme end that is drained by the Guyandot River, is all tributary to the Tug Fork and Twelvepole drainage basins, the watershed between these streams and the Guyandot River forming a natural division line.

Area.—The area of Mingo County, as determined by planimeter from the topographic sheets of the United States Geological Survey, is as follows:

Districts.	Square Miles.
Harvey	66.35
Warfield	37.99
Hardee	75.63
Lee	71.85
Williamson	3.32
Magnolia	72.20
Stafford	94.16
Total for County	423.50

Relief.—The surface of Mingo County varies from 585 feet above sea level at the mouth of Marrowbone Creek where Tug Fork crosses the Wayne County Line to 2450 feet at the government triangulation point three-fourths mile east of Calico where the line between Magnolia and Stafford Districts meets the Logan County Boundary Line. Another ridge between main Horsepen Creek and Browning Fork about three miles northeastward from the triangulation point shows the same contour elevation. The difference of elevation between the high and low points is 1865 feet, being 285 feet less than that for Logan County. The hills of Mingo County range in height from about 500 feet along the Wayne County Line to about 1200 feet in the Gilbert region.

Population.—The following table, taken from the U. S. Census returns for 1910, shows the population of Mingo County by magisterial districts for the last three enumerations:

Population of Mingo County.

Districts.	1910	1900	1890
Hardee District	1,888	1,302	2,490
Harvey District	1,306	2,696	.....
Lee District	2,946	2 301	831
Magnolia District, including Matewan City	5,077	3,020	1,510
Stafford District	3,466	2,040	.....
Warfield District	1,187	.....	.....
Williamson District, coextensive with Williamson City	3 561	.....	.....
Totals for County	19,431	11,359	

The organization of Mingo County from Logan in 1895 and the consequent change in magisterial districts make it impossible to secure complete returns for 1890, but the figures for 1900 and 1910 show a marked increase in population for that period, the increase being 71 per cent. As shown by the statistics for Logan County on a previous page of this Chapter, the increase is much greater than that for the state or nation during the same period. This great increase is directly due to the rapid development of the coal mining industry along the Tug Fork. The density of population in 1910 was 45.9 per square mile.

Products.—The principal animal products of Mingo County are hogs, poultry, cattle, horses, mules and dairy products.

The principal vegetable products are timber, corn, potatoes, apples and sweet potatoes.

The principal mineral products are coal and gas. Brick are manufactured from river clay at Williamson. The brick industry could be developed much more extensively in the county as there is an abundance of shale suitable for its manufacture. Sandstone of fair quality for building purposes is also available in all parts of the county. Hydro-electric power could easily be developed along Tug Fork.

As in all other coal counties of the state, the food products are entirely inadequate to the demand, making it necessary to ship large quantities into the county. The trucking industry could be developed with profit in all the mining communities. On the other hand, much of the coal that is now shipped out of the county could be used within its borders to develop a large general manufacturing industry.

Property Valuations.—The State Auditor gives the following property valuations for Mingo County for the two years ending with 1912:

	1911	1912
Real Estate	$10,657,961	$10.968,908
Personal Property	2,263,954	2,367,430
Totals	$12,921,915	$13.336,338

According to the above figures, Mingo County ranks sixteenth in the state in point of wealth.

Towns and Industries.

Williamson.—Williamson, incorporated as a town in 1894, and as a city in 1905, is the county seat of Mingo, and the county metropolis. It is situated on Tug Fork of Big Sandy River, about midway between the Wayne and McDowell County Lines is served by the main line of the Norfolk and Western Railroad. According to Guy White, Circuit Clerk of Mingo County, the population in 1890 was zero, but in 1900 it was 1200, and the government census of 1910 reports it 3561. The city is built on a sandy terrace, high enough above the river to give it drainage and protection from floods. Besides having the county offices and county business and being the supply point for a considerable portion of Mingo County and Pike County, Kentucky, Williamson is the center of the great coal mining industry of Mingo County and is the headquarters for many of the operating companies. Its growth, since the building of the Norfolk and Western Railroad in 1892, has been phenomenal and will doubtless continue for many more years, with the increase of the coal industry. The mines will be described in Chapter VIII.

The **Red Brick Company,** of Williamson, operates an extensive building brick plant here, which will be described in Chapter IX, under the subject of "Clay".

The **Norfolk and Western Railroad** has extensive freight classification yards at East Williamson, where a large number of coal cars are handled daily.

Matewan.—Matewan, situated on Tug Fork at the mouth of Mate Creek, nine miles east of Williamson by rail, was incorporated as a city September 16, 1895. Its population as reported by the census of 1910 is 588. The town owes its existence and growth to the lumber and coal mining industries of the surrounding region, the traffic being handled by the Norfolk and Western Railroad. There are no factories.

Kermit.—Kermit, situated on Tug Fork about one mile from the Wayne County Line, and incorporated as a village December 15, 1909, has a population estimated in 1913 at 300. It is the center of a large gas industry.

The, **United Fuel Gas Company** is building a large gas compressor station in Kermit that is designed to force natural gas through a 16-inch pipe line to Louisville, Kentucky.

Villages.—The following table gives a list of the unincorporated towns and villages of Mingo County, with their respective populations. Small settlements, containing only a few persons, are not given. Those which are mining towns are given in black face type:

Population of Villages in Mingo County.

Village.	Population	Village.	Population
Blocton	75 (E)	Lenore	81 (R)
Breeden	74 (R)	**Merrimac**	25 (R)
Cedar	115 (R)	Naugatuck	200 (E)
Chattaroy	1000 (E)	Rapp	141 (R)
Delorme	235 (R)	**Red Jacket**	600 (E)
Devon	235 (R)	**Sprigg**	400 (E)
Dingess	75 (E)	**Thacker**	235 (R)
Gilbert	120 (E)	Vulcan	69 (R)
Glenalum	1000 (E)		

E.—Estimates by postmaster or other reliable person in 1913.
R.—Rand-McNally Shippers' Guide, population for 1910.

CHAPTER II.

PHYSIOGRAPHY.

PHYSIOGRAPHIC CHANGES.

Logan and Mingo Counties lie in the region immediately northwest of the main Appalachian system and their physical features are the result of physiographic changes that have molded the entire western region of West Virginia. The general principles of physiography as applied particularly to this region have been explained in previous County Reports of the Survey[1] and need not be given in the present volume.

The studies of geologists in the Appalachian region show that the great mountain system just southeast of Logan and Mingo was formed by a folding of the earth's surface at the close of Permian time. The same folding that formed the main mountain chain also developed minor folds through the two counties of which the principal one is the Warfield Anticline that will be fully described in Chapter III. As the mountain masses gradually rose to their great height under lateral pressure, drainage systems naturally developed along the northwestern slope, flowing toward the great inland Appalachian sea. There is no marked interruption of these drainage systems by any of the minor folds. The Guyandot River in Logan and the Tug Fork of Big Sandy in Mingo County both cut directly across the Warfield Anticline without swerving from their general courses. This fact shows that the folding of the anticline must have been so gradual that these rivers were able to cut down their channels about as fast as the rocks rose upward.

During Cretaceous time the general surface of the region was reduced to a peneplain sloping gradually northwestward.

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[1] G. P. Grimsley, Ohio-Brooke-Hancock Report, pp. 18-21, 1906; Ray V. Hennen, Marshall-Wetzel-Tyler Report, pp. 32-37, 1909.

Toward the end of the Cretaceous period, this peneplain was re-elevated to a considerable height. Remnants of this ancient peneplain are now visible in the high hill summits across the two counties. Along the northwestern border of Logan and Mingo, these high summits range from 1300 to 1400 feet above sea level. Along the southeastern boundary of the two counties, the high summits range from 2200 to 2700 feet above sea level, making a general rise of more than 1000 feet in the ancient peneplain surface across the territory.

Marius R. Campbell, of the United States Geological Survey, describes a subsidiary plateau in the Charleston and Huntington regions that is also evident in Logan and Mingo. His description of this secondary plateau is as follows[2]:

> "By a close study of the topographic map, it will be seen that the summits of the ridges decrease in height on approaching the principal streams of the region. This change in height is usually noticeable several miles back from the stream, but after a descent of a few hundred feet, the ridges extend with nearly level top to the very brink of the gorge in which the river flows. The projecting spurs on both sides are of about the same altitude, and the conclusion seems almost inevitable that at some time the large streams of this region were flowing in broad, shallow valleys, the bottom of which corresponded with the level of the tops of the spurs along the river and the sides with the gentle slopes at a distance of several miles from the present streams.
>
> "This region may be restored in the imagination to approximately the condition just described by supposing the valleys of the principal streams to be filled to the height of the bordering hills. It will be seen that this surface was one of comparatively low relief. Along the major streams the valleys were broadened to a considerable extent, especially in the softer rocks, and the valleys of the lesser rivers were cut somewhat in proportion to the volume of water carried by each."

There is no evidence of any extensive change of surface features in recent time. In sharp contrast to the drainage from the area of outcropping sediments of the Pottsville Series in northern West Virginia, where the streams are turbulent mountain torrents descending several hundred feet to the mile, the streams of Logan and Mingo are placid and free from water falls. While this is true, the valleys are sharp and V-shaped, indicating that the streams have not reached base level.

There is abundance of evidence that some of the streams reached base level during the time of the Cretaceous peneplain.

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[2] Charleston Geologic Folio, No. 72, U. S. Geological Survey, 1901.

Both the Guyandot and Tug Fork have very sinuous courses that they have inherited from Cretaceous time. The present narrow valleys indicate that these streams have not reached such an advanced stage in the present cycle of erosion as in Cretaceous time, though maturity is approaching.

The following table, prepared by Gawthrop, shows various features of stream flow in the two counties. The last column gives the ratio of the total distance (T.D.) to the air line distance (A.L.D.), indicating the amount which a stream has deviated from a straight course in that portion designated in the first column. If a stream were straight, this ratio would be 1.0:

Table of Stream Data.

Streams.	Total Dis. Miles	Total Fall Feet	Rate of Fall Per Mile Feet	Air Line Dis. Miles	Ratio T. D. to A.L.D.
Guyandot River, Justice to Man....	16.8	175	10.4	10.8	1.6
Guyandot River, Man to Logan.....	13.2	60	4.6	9.7	1.4
Guyandot River, Logan to Toney..	18.4	50	2.7	11.8	1.6
Hart Creek, Whirlwind to mouth.	9.4	140	14.9	7.2	1.3
Big Creek, Garrett Fork to mouth.	7.8	210	27.0	6.3	1.1
Island Creek, Right Fk. to Pine Ck.	5.1	310	60.8	4.5	1.1
Island Creek, Pike Ck. to mouth..	9.3	160	17.2	6.5	1.4
Copperas Mine Fork, Holden to mouth	3.4	80	23.5	3.2	1.1
Mud Fork, three forks to mouth	6.0	250	41.7	5.3	1.1
Dingess Run, Ethel to mouth.....	3.8	160	42.1	3.6	1.1
Rum Creek, Slagle to mouth.....	7.2	560	77.8	5.6	1.3
Buffalo Creek, Davy Branch to Robinette	5.7	260	45.6	4.5	1.3
Buffalo Creek, Robinette to mouth	6.4	230	35.9	5.5	1.2
Huff Creek, Wyoming County Line to mouth......................	9.0	260	28.9	6.9	1.4
Elk Creek, Mill Branch to mouth..	5.8	480	82.8	5.1	1.1
Gilbert Creek, Mudlick Branch to Horsepen	4.9	290	59.2	3.2	1.2
Gilbert Creek, Horsepen to mouth	2.4	70	29.2	1.5	1.6
Horsepen Creek, Smith Branch to mouth	4.4	240	54.6	3.7	1.2
Leatherwood Creek, Pointlick Branch to mouth..............	2.5	240	96.0	2.2	1.1
Spruce Fork of Coal River, Brushy Fork to Sharples...............	10.0	310	31.0	5.1	2.0
Spruce Fork of Coal River, Sharples to Clothier............	2.8	50	17.8	2.0	1.4

Table of Stream Data.—Continued.

Streams.	Total Dis. Miles	Total Fall Feet	Rate of Fall Per Mile Feet	Air Line Dis. Miles	Ratio T. D. to A.L.D.
East Fork of Twelvepole Creek, Blair Fork to Trace Branch....	7.1	200	28.2	5.2	1.4
East Fork of Twelvepole Creek Trace Br. to Wiley Branch.....	6.7	90	13.4	4.7	1.4
West Fork of Twelvepole Creek, Dingess to Kiln Creek..........	4.7	90	17.8	3.7	1.3
West Fork of Twelvepole Creek, Kiln Creek to Wilsondale......	10.0	120	12.0	6.3	1.6
Tug Fork of Big Sandy River, McDowell County Line to Thacker..	24.7	180	7.3	12.5	2.0
Tug Fork of Big Sandy River, Thacker to Williamson...........	17.6	50	2.8	9.7	1.9
Tug Fork of Big Sandy River, Williamson to Wayne County Line	23.0	65	2.8	14.7	1.6
Jennie Creek, Upper Honey Branch to Dicy.................	4.0	150	37.4	2.6	1.5
Marrowbone Creek, Lick Branch to Pickletub Branch............	8.0	330	41.2	5.7	1.4
Marrowbone Creek, Pickletub Branch to mouth...............	4.6	70	14.3	3.6	1.3
Pigeon Creek, Nighway Branch to Rockhouse Fork..................	13.7	530	40.2	9.5	1.4
Pigeon Creek, Rockhouse Fork to Trace Fork.....................	7.4	100	13.5	5.4	1.4
Pigeon Creek. Trace Fork to mouth	7.8	40	5.1	6.3	1.2
Laurel Fork, Panther Branch to mouth	11.9	365	30.3	7.7	1.5
Laurel, Right Fork, Buddy Branch to mouth.............	5.3	200	38.5	4.3	1.2
Trace Fork. Dingess Camp Branch to mouth..............	7.2	235	32.7	5.3	1.4
Elk Creek, three forks to mouth..	3.8	170	44.7	3.2	1.2
Rockhouse Fork, Spring Branch to mouth......................	6.3	280	44.4	5.3	1.2
Buffalo Creek, last fork to mouth..	4.8	405	84.5	4.2	1.1
Mate Creek, Meador to mouth......	7.8	490	62.8	5.4	1.4
Beech Creek, Hinch to mouth......	6.7	480	71.6	5.2	1.3
Alum Creek, Glenalum to mouth....	3.0	280	93.4	2.7	1.1
Bens Creek, Walnut Hollow to mouth	4.5	250	55.5	3.5	1.3
Left Fork, Lefthand Fork to mouth	4.6	350	76.1	3.6	1.3
Fourpole Creek, Sims Fork to mouth	3.6	355	98.8	3.0	1.2

In the above table, the deviations from a straight course in most of the streams is due to their ancient base-leveled condition during the time of the Cretaceous peneplain rather than to any interruption of direction by the structural features which they cross. The lack of structural influence is shown also by the regularity of the stream profiles, most of which show a rate of fall that decreases uniformly from head to mouth, which is an entirely normal condition.

DRAINAGE BASINS.

The drainage of Logan and Mingo Counties all reaches the Gulf of Mexico via the Ohio and Mississippi Rivers. The tributary streams conveying the water to the Ohio are the Guyandot, flowing direct to the Ohio, and Little Coal Rivers, flowing into the Great Kanawha, in Logan, and the Tug Fork of Big Sandy River and East and West Forks of Twelvepole Creek in Mingo County.

The following table, computed with planimeter by Gawthrop principally from the topographic sheets of the United States Geological Survey, gives the areas of these main drainage basins as well as those of the smaller streams. The area of the Tug Fork basin is partly an approximation owing to the lack of accurate maps on the Kentucky side:

Area of Drainage Basins.

Streams.	Square Miles
Guyandot River, including Big Hart Creek	1090.00
Big Hart Creek	45.52
Big Creek	28.97
Crawley Creek	16.52
Island Creek, total above mouth	104.95
Main Island Creek above mouth of Copperas Mine Fork	56.92
Copperas Mine Fork	32.40
Mud Fork	13.90
Dingess Run	22.88
Rum Creek	19.25
Rich Creek	11.22
Buffalo Creek, total above mouth	45.14
Right Fork of Buffalo Creek	10.12
Huff Creek	41.35
Rockhouse Creek	8.24
Elk Creek	16.28
Gilbert Creek, total above mouth	29.38
Horsepen Creek, above mouth of Horsepen	15.44
Leatherwood Creek	4.00
Hewett Creek	18.16
Spruce Fork of Coal River above Clothier	51.52

Area of Drainage Basins.—Continued.

Streams	Square Miles
East Fork of Twelvepole Creek above Lincoln-Mingo Co. Line	22.10
West Fork of Twelvepole Creek above Wayne-Lincoln-Mingo County Line	29.70
Tug Fork of Big Sandy River, including Marrowbone Creek.	1375.00
Marrowbone Creek	22.97
Pigeon Creek, total above mouth	142.00
Laurel Fork	32.68
Trace Fork	21.50
Elk Creek	12.59
Rockhouse Fork	16.15
Buffalo Creek	7.35
Mate Creek	16.38
Thacker Creek	5.96
Grapevine Creek	5.23
Beech Creek	14.16
Alum Creek	4.55
Bens Creek	22.50
Fourpole Creek	5.72

Guyandot River.

The Guyandot River heads in Raleigh County and flows in a general northwesterly direction through Raleigh, central Wyoming, southeastern Mingo, central Logan, western Lincoln, and western Cabell Counties, to the Ohio River at Guyandot, near Huntington. The area of its drainage basin above and including Big Hart Creek is 1090 square miles. It drains almost all of Logan County. Through the latter the stream is wide, shallow and sluggish. Its course is locally crooked due to the meanderings inherited from the Cretaceous cycle of erosion. The valley walls of the river and its tributaries are steep and high which should cause the run-off to take place quickly after storms. Almost all of the land through which the river and its tributaries flow in Logan County is wooded, however, most of it being cut-over territory. This large percentage of woodland, together with the sandy and porous nature of the rock formations, which take up a considerable portion of every rainfall, retards the run-off to a considerable extent and thus lessens the floods which would otherwise cause serious damage in the valley.

At its source in Raleigh County, the mountains have an elevation of more than 3000 feet, but at the Logan-Lincoln

County Line, the elevation of the river is only 600 feet above sea level.

The flood plain of the river at Ferrellsburg, two miles northwest of the Logan County Line, is 44 feet high, and at Chapmanville, 46 feet by hand-level, while at Logan it is approximately 30 feet, and at the Mingo-Wyoming Line, about the same.

No terraces were observed along the river in either of the two counties.

Spruce Fork of Little Coal River.

Spruce Fork of Little Coal River drains 51.52 square miles of territory in northeastern Logan County. It has its source in eastern Logan, where the hills have an elevation of 2500 feet above sea level, and flows northward to Clothier on the Boone-Logan County Line, descending to an elevation of only 800 feet.

At Madison, Boone County, eight miles north of Clothier, it joins with Pond Fork to form Little Coal River. The topography along its course is steep and the drainage basin is mostly wooded. Nothing reliable is known about the conditions of run-off.

The course of Spruce Fork shows numerous local deviations from its general northward course, indicating a former base-leveled condition.

East Fork of Twelvepole Creek.

East Fork of Twelvepole Creek drains a portion of northeastern Mingo County. Its source is along the Logan-Mingo County Line at an elevation of 1750 feet above sea level. It flows northwestward, reaching the Mingo-Lincoln County Line at an elevation of 775 feet. At Wayne, Wayne County, twenty-four miles farther northwest, it unites with West Fork to form main Twelvepole Creek which empties into the Ohio River at Ceredo, Wayne County. East Fork of Twelvepole flows through a sandy, wooded country, and the run-off is not violent. In dry seasons little water is left in the stream. The area of its drainage basin above the Lincoln County Line is 22.10 square miles.

West Fork of Twelvepole Creek.

West Fork of Twelvepole Creek rises at the Logan-Mingo County Line, four miles southeast of Dingess, the hills at its source having an elevation of 1750 feet above sea level, and flowing northwestward nearly parallel to East Fork of Twelvepole Creek, reaches the western boundary of Mingo County at its common corner with Wayne and Lincoln, where its elevation is 750 feet. At Wayne, it unites with East Fork to form the main Twelvepole Creek. Topographic and run-off conditions are much the same as along East Fork. The area of its drainage basin in Mingo County is 29.70 square miles.

Tug Fork of Big Sandy River.

The Tug Fork of Big Sandy River is the principal drainage feature of Mingo County. Its source is in Tazewell County, Virginia, just east of McDowell County, where the hills have an elevation of 3000 feet above sea level. From its source it flows northwestward through McDowell County to the Mingo County Line, where it becomes the boundary line between Mingo and Buchanan County, Virginia, until it reaches the Kentucky-Virginia State Line, and then separates Mingo from Pike and Martin Counties, respectively. At the Mingo-Wayne County Line, it has an elevation of 585 feet above sea level. At Louisa it joins Levisa Fork to form the Big Sandy River, emptying into the Ohio at Kenova.

The drainage basin of Tug Fork, above and including Marrowbone Creek, is 1375 square miles. A considerable part of this drainage originates in Kentucky and a small amount of it in Virginia. The hills along its course are high and steep, but, being wooded and sandy, prevent to some extent the violent run-off that would otherwise take place at times of heavy rainfall, although the floods are often severe.

While the course of Tug Fork is generally toward the northwest, there are numerous local deviations that show clearly the channel inherited from the ancient base-leveled stage during the Cretaceous peneplain.

The principal tributary of Tug Fork in Mingo County is Pigeon Creek, having a drainage basin of 142 square miles and emptying at Naugatuck.

The only evidence of a terrace in Mingo County was observed one-half mile south of Matewan, where Hennen found a deposit of alluvial and white silty clay intermingled with large quartz pebbles, coming at an elevation of 750 feet above sea level and about 75 feet above river level. No rounded boulders were observed.

At Kermit, the flood plain, by hand-level measurement, has a height of 49 feet. At the mouth of Long Branch, 1.7 miles west of Naugatuck, its height, by hand-level, is 47 feet, and at Williamson, 30 to 40 feet.

TOPOGRAPHIC FEATURES.

The topography of Logan and Mingo is steep and rugged. The streams have cut their channels deep through the surface rocks, making sharp V-shaped valleys. In the western end of the two counties, the hills are from 400 to 600 feet above the valleys, but their height increases rapidly southeastward so that in the southeastern region, ridges 1200 to 1500 feet high are the rule.

The hillsides are broken frequently by narrow flat benches, marking the deposits of shale and coal that separate the massive ledges of sandstone that compose the greater part of the surface rocks. These benches are not readily seen from the valleys, as their narrowness and the forest that usually covers the hills give the appearance of a slope that is uniformly steep. The tops of the ridges are sharp, being frequently only wide enough for narrow trails along them. There are numerous low divides and corresponding sharp points that rise several hundred feet above them.

The geologic structure has influenced the topography only to a slight degree. There are no long gentle slopes showing the structural divide along the Warfield Anticline, and no trough-like valley marking the course of the Coalburg Syncline. The erosive work of the stream has been more rapid along the anticlines than along the synclines so that the topography is no guide to the structure. At close range, however, the narrow shale and coal benches, where exposed by clearings, are of considerable help in following structure. These benches are often obscured by the forest growth or by the great mass of sandy debris that frequently covers the slopes, especially near the foot of the hills.

Since the Pottsville Rocks of Logan and Mingo contain no unusually hard ledges, but are composed largely of sandstone members of medium hardness, separated by thin beds of shale, and there is no consequent ponding of the streams, there are no glades such as are found in the northern part of the state where these rocks outcrop. There are no waterfalls or extensive rapids in the streams. They show remarkably uniform profiles, having only a slight fall until near the source where the streams terminate against the steep ridges, indicating that lateral erosion will soon begin. This condition is recognized by the coal operators of the two counties who find no difficulty in securing easy railroad grades to the heads of the streams.

PART II.

Geology.

CHAPTER III.

STRUCTURE.

Description of Terms.

Geologic structure, which is that branch of geology treating of the pitch of stratified rocks, has been the subject of general discussion in previous county reports of the Survey. Since these reports are available, the discussion will not be repeated here, but the following paragraph, taken from a former report,[1] gives a definite idea of simple scientific terms that will benefit the general reader:

> "In the discussion of these structural forms on subsequent pages, the upward bending arch is known as an **anticline**; the downward bending trough, a **syncline**; the line joining the highest points of an anticline or the lowest points of a syncline, the **axis** of the fold; the direction of the horizontal edges of dipping strata, the **strike**; and the structural form resulting from the sudden rise or fall of the axis of an anticline, the **nose** of the fold."

Method of Representing Structure.

The contour method has been used in this report for representing the geological structure of the Logan and Mingo area. By this method of representation, a single coal bed or other prominent and easily recognized geological horizon is used as a "key" rock and its position above sea level is determined either by observations made directly upon it or by its interval computed from other known horizons above or below it in the rock column. The **Campbell Creek** or No. 2 Gas Coal is the most persistent and easily recognized coal in Logan and Mingo Counties and has therefore been used as the key rock for determining structure. The elevation of the base of this coal above sea level is shown on Map II, which accompanies this report in a separate atlas, by means of green structure contour lines, each of which is plainly marked with figures to show the height above sea level, in feet, that it represents. Each contour line is a line of strike showing that the Campbell Creek Coal is at the same height above sea level at all points through which the contour line passes. The contour interval is 25 feet, making it possible to know, with reasonable certainty, the approximate elevation of any given horizon at any particular point. The elevations on the coal were determined, where possible, by spirit level from known points on the topographic map. Where such points were not available, the aneroid was used and carefully checked at numerous times during the day on spirit level determinations. In regions where the Campbell Creek Coal was below drainage, or could not be found in the hills, other coals were used and the true position of the Campbell Creek determined by the known intervals from them. Since there is a great variation in the thickness of the several formations in different parts of the two counties, constant intervals, above and below the Campbell Creek Coal, could not be used, so that it was necessary to make numerous vertical sections of the rock column to get sufficient information regarding this variation in intervals. The following table, showing the interval from the base of the Campbell Creek Coal to the other coals both above and below it, and being largely determined by actual sections made at the several points, was used in making the structure map. As a rule, the intervals thicken in going from the northwest toward the southeast, but this is not always true, as may be observed from the table:

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[1] Ray V. Hennen, Monongalia-Marion-Taylor Report, W. Va. Geol. Survey, p. 76; 1913.

Intervals Above and Below Campbell Creek (No. 2 Gas) Coal.

Formation.	Big Creek.	Logan.	Manbar.	Amherst.	Clothier.	Lincoln-Logan-Mingo Corner.	Breeden.	Dingess.	Kermit.	Naugatuck.	Chattaroy.	Burch.	Williamson.	Rawl.	Matewan.	Delorme.	Cedar.	War Eagle.
No. 5 Block Coal	875	1135	1145	1120	1113	680	725	800	740	775	950		1020	1160				
Stockton Coal	745	925	985		903	625		690		675	816			1018				1025
Coalburg Coal	655	840	880	870	748	490	535	590	540	576	726		790	907				875
Little Coalburg Coal					727													852
Buffalo Creek Coal			745		645						641			811				775
Winifrede Coal	560	600	645		543	440		510	440									675
Chilton "A" Coal		525			494	420	345			406								625
Chilton Coal	380	435	495	520	410	300	310	350	340	356	419			546				535
Little Chilton Coal		385					265		275		386							498
Hernshaw Coal	280	350			342	250	250	280	225	234	369							445
Dingess Coal	220	320				180	180	215		190	340							415
Dingess Limestone	185	300	365	300	231	135	155	190	150	180	293			352				383
Williamson Coal	180	290	355		220	130				175	258		292	306				345
Cedar Grove Coal	130	189	255	250	167	90	100	140	90	110	200	200	225	235	240		265	245
Cedar Grove Coal, Lower			195		131					100							180	170
Alma Coal	85	137	156	150	105	60	60		44	80	96		110	110			110	115
Little Alma Coal														59				62
CAMPBELL CREEK COAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Powellton "A" Coal		25																52
Powellton Coal		45								23								75
Matewan Coal			135															135
Eagle "A" Coal			174															177
Eagle Coal			207													210		230
Bens Creek Coal																		265
Little Eagle Coal																270	275	345
Cedar Coal																295	300	369
Eagle Limestone			315													355		421
Lower War Eagle Coal																	367	490
Glenalum Tunnel Coal																		590
Gilbert Coal																		675

The sections from which the foregoing table was made, as well as many other sections, are published in Chapter IV and should be carefully studied by those who desire to make local investigations of any coal, since they contain much detailed information that cannot be shown in the table of intervals or on Map II. In order to find the approximate elevation of any coal, its interval from the Campbell Creek (No. 2 Gas) should first be obtained from the preceding table or from the local sections given for the nearest point. With the structure contours as a guide, the coal should easily be found.

DETAILED STRUCTURE.

General Features.

As shown by Map II, the structure of Logan and Mingo Counties has been only slightly disturbed by lateral or upward movements of the earth's crust.

There is a gradual rise of the rocks from the northwest to the southeast, interrupted by occasional anticlines and corresponding synclines. The pitch of the rocks is nowhere excessive and in most regions is hardly perceptible to the eye, careful levels on the coals being necessary to determine the nature and rate of change. The lowest point of structure found in either county was along the Tug Fork of Big Sandy River, two miles northwest of Naugatuck, Mingo County, the elevation of the Campbell Creek (No. 2 Gas) Coal being only 350 feet above sea level where the Coalburg Syncline crosses the Kentucky State Line. The highest structural point is in the southeastern part of the area at the common corner of Mingo, McDowell and Wyoming Counties, where the Campbell Creek (No. 2 Gas) Coal is 1800 feet above sea level. The general direction of most of the anticlines and synclines is northeast and southwest, corresponding closely to the trend of the Appalachian Mountain System. Only one anticline and one syncline extend entirely across the two counties. In most of the territory the structure is devoid of special features. In western Mingo, however, where the Warfield Fault enters the state from Kentucky, the structural surface is warped sufficiently to form secondary synclines and domes immediately south of the fault. That these secondary features are directly traceable to the fault is shown by the fact that they all occur on the south side of the Warfield Anticline near the fault and that on the north side of the anticline where there is no fault, no such secondary features appear.

The structure map, as published, does not harmonize entirely with those shown for Wayne and Lincoln Counties previously issued.[2] On the structure maps for these counties, the Pittsburgh Coal was used as a key rock, its interval above the Campbell Creek (No. 2 Gas) Coal used in Logan and Mingo being about 1200 feet and containing all the rocks of the Conemaugh, Allegheny and part of the Kanawha Series. Besides the sag in contours caused by the use of a lower key rock, several changes in correlation along the Wayne and Lincoln Lines, made necessary by the field studies for the present Report, have altered the structural representation. Much of the information used in making the Logan and Mingo structure map was gained by joint studies, made in 1913, by members of the Survey in Kanawha, Boone, Logan and Mingo Counties and was not available when the structure maps of Wayne and Lincoln were drawn. These changes in correlation will be discussed in detail in Chapter VI.

Anticlines.

Four anticlines, the Doane, Warfield, Laurel Fork, and Williamson, are shown on the structure map.

Doane Anticline.—The Doane Anticline of Krebs[3], named from Doane Station on the Norfolk and Western Railroad in Wayne County, appears first at a point three miles southeast of East Lynn, Wayne County, and extends roughly southward to the Wayne-Mingo Line. In Wayne County it is nowhere a prominent fold. It crosses the Mingo County Line 2.5 miles south of Wilsondale and extends southeastward three miles to a junction with the Warfield Anticline, a much more prominent fold, at Swelled Hickory Gap. The axis rises steadily from the Wayne-Mingo Line to its southeastern terminus, the elevation of the Campbell Creek (No. 2 Gas) Coal at the county line being about 610 feet, while at Swelled Hickory Gap it is 685 feet, the rise along the arch being 25 feet per mile. The surface geology is mainly that of the Kanawha Series although the Allegheny Series is present in some of the summits.

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[2] C. E. Krebs, Cabell-Wayne-Lincoln Report; 1913.

[3] C. E. Krebs, Cabell-Wayne-Lincoln Report, W. Va. Geol. Survey, p. 278, 1913.

Warfield Anticline.—The Warfield Anticline of White[4] is the only important structural arch in Logan and Mingo Counties. It extends entirely across the two counties in a northeast-southwest direction and is a prominent fold all the way along its course.

According to Krebs[5], the anticline first becomes noticeable in northern Kanawha County at Eight post-office on Campbell Creek and develops rapidly into an important arch crossing the Great Kanawha River ¾ mile southeast of Marmet, the Big Coal River, near Peytona, Boone County, and Little Coal River a short distance south of Madison, and thence southwestward to the Boone-Logan Line. In northern Kanawha County, it is possible that if sufficient well borings were available to plat the elevations on the top of the Greenbrier Limestone, it would be found that the Warfield Anticline merely descends to a low saddle in that region, and is further continued northeastward by the Chestnut Ridge Anticline of northern West Virginia and Pennsylvania, but in this portion of Kanawha County there is such a great thickening of the Kanawha Series from the Elk River southeastward that the surface structure indicates only a rapid rise southeastward.

Since the anticline was noted and named as the "Warfield" in the southern counties of the state before its connection with the Chestnut Ridge had been suggested in the central counties, the name "Warfield" instead of "Chestnut Ridge" will be used in referring to the anticline in the present Report.

The Warfield Anticline crosses the Boone-Logan Line 5.5 miles northwest of Clothier and extends southwestward crossing the Guyandot River ¼ mile north of Pecks Mill, and, passing through the divide between Crawley Creek and Mud Fork, enters Mingo County at the head of East Fork of Twelvepole

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[4] I. C. White, "Science" July 17, 1885; and Vol. I, W. Va. G. S., p. 276; 1899.

[5] C. E. Krebs, Kanawha Report, W. Va. Geol. Survey. p. 59; 1914.

Creek. In Mingo it passes through Dingess on the Norfolk and Western Railroad, bends slightly to the northwest to its junction with the Doane Anticline at Swelled Hickory Gap and then turns southwestward again until it finally crosses the Kentucky Line at Kermit, one mile east of Warfield, Kentucky, from which it was named.

In Logan County the fold is symmetrical about its axis, the dip of the rocks being nearly the same on either side. In Mingo, however, the **Warfield Fault**[6] extends entirely across the county about one-half mile south of the crest of the Warfield Anticline and has much disturbed the slope of the rocks in that region. This fault on the south and the Doane Cross Anticline on the north have warped the structure into peculiar forms that may best be studied by referring to Map II.

The surface geology along the Warfield Anticline is that of the lower Allegheny and Kanawha Series. At the Boone-Logan Line, the Campbell Creek (No. 2 Gas) Coal has an elevation along the axis of 1175 feet above sea, the highest point reached along the anticline in either county. At this point the axis is rising toward the dome that occurs in Boone County near where the anticline crosses Little Coal River. From the Boone County Line, the axis pitches southwestward for 10 miles at the rate of 17.5 feet per mile. Where the anticline crosses the head of Hart Creek, there is a saddle at which the Campbell Creek (No. 2 Gas) Coal is less than 1000 feet above sea level. The axis then rises 50 feet to a small dome just east of the Logan-Mingo Line. From this dome it pitches rapidly westward at a rate of more than 50 feet per mile to Dingess where the pitch becomes less abrupt, but, with the exception of a slight rise just southeast of Swelled Hickory Gap, is continuous to the Kentucky Line at Kermit where the Campbell Creek (No. 2 Gas) Coal has an elevation of 625 feet above sea level. From the Boone County Line to the Kentucky Line at Kermit, there is a total fall of 550 feet along the axis of the anticline or at the rate of about 18 feet per mile.

Laurel Fork Anticline.—The Laurel Fork Anticline, which has not been previously described, is a short spur, eight miles long, that branches from the Warfield Anticline four miles northeast of Dingess. The anticline with a general southwest course, extends across the head of Mud Fork of Island Creek, passes through the divide between West Fork of Twelvepole Creek and Copperas Mine Fork of Island Creek, crosses Left Fork of Laurel one-half mile east of Panther Branch and extends about one mile northeast of the mouth of Right Fork of Laurel. The anticline is symmetrical about its axis, the dip of the rocks being much the same on either side. The surface geology is that of the lower Allegheny and Kanawha Series. The Campbell Creek (No. 2 Gas) Coal, at the junction of the anticline with the Warfield, is 1025 feet above sea level; it plunges downward along the axis at the rate of 60 feet to the mile to a saddle at the head of Twelvepole Creek and rises again to a pronounced dome on Right Fork of Laurel, where it is 875 feet above sea level. From this dome westward the axis dips again at the rate of sixty feet per mile for the next two miles, after which a steep nose appears around its western terminus between the Coalburg and Canterbury Synclines.

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[6] First described by I. C. White, Vol. II(a), W. Va. Geol. Survey, pages 380 and 402.

Williamson Anticline.—The Williamson Anticline is a short fold in southern Mingo County that has never been previously described. It is a short symmetrical fold, five miles long, that starts about five miles northeast of Williamson and extends southwestward to East Williamson where it crosses Tug Fork into Kentucky. The surface geology is that of the lower Allegheny and Kanawha Series, the Campbell Creek (No. 2 Gas) Coal reaching an elevation of 700 feet above sea level along the highest part of the anticline.

Synclines.

Four synclines, the **Coalburg, Burning Creek, Canterbury,** and **Lick Creek,** appear on the structure map of the two counties.

Coalburg Syncline.—The Coalburg Syncline of Krebs[7] is the only extensive downward fold of the strata in Logan and

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[7] C. E. Krebs, Kanawha County Report, W. Va. Geol. Survey, p. 62; 1914.

Mingo Counties. According to Krebs, its northern terminus is in Kanawha County, near the mouth of Little Ugly Branch of Witchers Creek, four miles north of Monarch. From this point it extends southwestward, crossing the Great Kanawha River between Coalburg and Cabin Creek Junction and passing southwestward through Kanawha and Boone Counties.

The syncline crosses the Boone-Logan County Line one-half mile southeast of Clothier, extends southwestward to Ethel and thence follows closely the valley of Dingess Run southwest to the Guyandot River, which it crosses at McConnell, two miles southeast of Logan. From the Guyandot River the syncline extends southwest, crossing Island Creek at Monaville, and passing through the forks of Whitman Creek, to Laurel Fork of Pine Creek. Here it is deflected to a course nearly due west and crossing the Logan-Mingo Line one mile west of Laurel Fork extends westward one mile south of Myrtle, crosses Trace Fork of Pigeon Creek one-half mile from its mouth, follows the valley of Pigeon Creek through Lenore and Eugene to the mouth of Big Branch. From Big Branch its course is northwestward to the Hardee-Warfield District Line where it again assumes a westward direction and finally crosses the Mingo Line into Martin County, Kentucky, just west of the mouth of Parsley Big Branch, 2½ miles southeast of Kermit.

The Coalburg Syncline, throughout most of its course in the two counties, is not symmetrical about its axis. In Logan County north of the Guyandot River, the slope of the rocks is much steeper on the northwestern side, the rise from the syncline being at the rate of 200 feet to the mile for the first 2½ miles from the bottom of the trough. In this same region the rise of the rocks southeast of the trough is only 75 feet per mile. Southwest of the Guyandot River, the rocks are not so steep north of the syncline, the upward slope from the basin being much more gentle during the remainder of its length in Logan and also in Mingo County. In western Mingo the structure is complicated by the appearance of two small branch synclines, the Canterbury and Burning Creek, which are evidently a secondary result from the Warfield Fault, and which disturb the symmetry of the main syncline.

The surface geology of the Coalburg Syncline is that of the lower Allegheny and Kanawha Series. At the Boone-Logan Line the elevation of the Campbell Creek (No. 2 Gas) Coal is less than 450 feet above sea level; between Ethel and Foley it descends to less than 425 feet; from the Guyandot River westward the rise is gradual, broken only by a slight depression where the axis crosses Whitman Creek, to the region just southeast of Myrtle, where there is a saddle or structural watershed at which the Campbell Creek (No. 2 Gas) Coal is more than 550 feet high. From this saddle the dip is continuous and fairly uniform at the rate of 18 feet per mile to the Mingo-Martin County Line, where the elevation of the Campbell Creek (No. 2 Gas) Coal is less than 350 feet above sea level, the lowest structural point in the two counties.

It is quite possible that the Coalburg Syncline is a continuation of the Ligonier Syncline of western Pennsylvania. The Ligonier has been traced across Preston and Taylor Counties in the northern part of the state where it is a prominent syncline just east of the Chestnut Ridge Anticline. The Coalburg Syncline has been traced in the southern part of the state through Mingo, Logan, Boone, and part of Kanawha Counties, where it is a prominent syncline just east of the Warfield Anticline, supposed to be an extension of the Chestnut Ridge. It is possible that the flattening of the Coalburg Syncline in northeastern Kanawha is only local, like that of the Warfield-Chestnut Ridge Anticline and that through the counties of Clay, Braxton, Gilmer, Lewis, Upshur and Barbour it may assume important proportions. The reason for this theory is the fact that the Chestnut Ridge Anticline, as previously described, has been traced across the state immediately west of the probable extension of the Ligonier Syncline just mentioned. Further studies in these intermediate counties, however, will be required to verify this idea.

Burning Creek Syncline.—The Burning Creek Syncline, not previously described, is a short and fairly symmetrical branch of the Coalburg Syncline in western Mingo County. It connects with the parent syncline one mile from the Tug Fork of Sandy and extends northeastward for five miles across the headwaters of Upper Burning Creek, then follows roughly the

Warfield-Hardee District Line for a short distance and finally dies out at Big Laurel Branch of Marrowbone Creek. Its occurrence and development are thought to be a secondary result of the formation of the Warfield Fault to which it is closely parallel. The surface geology along it is that of the lower Allegheny and Kanawha Series, the Campbell Creek (No. 2 Gas) Coal having an elevation of 500 feet above sea level at Big Laurel Branch and descending at the rate of 30 feet per mile to the main Coalburg Syncline where it is only 350 feet above sea level.

Canterbury Syncline.—The Canterbury Syncline, not previously described, is another offshoot from the Coalburg, originating at the head of West Fork of Twelvepole Creek, against the southern slope of the Warfield Anticline, two miles southeast of Dingess, it extends in a general southwesterly direction through Hale Station, and, passing about one-third mile east of Canterbury and Rapp, finally joins the Coalburg Syncline one-half mile east of Lenore. During a large part of its length, it closely follows the valley of Laurel Fork of Pigeon Creek. The axis plunges from its source at the average rate of 35 per mile until it joins the Coalburg, the elevation of the Campbell Creek (No. 2 Gas) Coal on Twelvepole Creek being nearly 800 feet while at Lenore it is only 450 feet above sea level. The slopes on either side are symmetrical. The surface geology is that of the lower Allegheny and Kanawha Series. The Canterbury Syncline, like the Burning Creek, just described, is evidently a resultant from the formation of the Warfield Fault to the north of it, as in the upper part of its length the syncline is closely parallel to the fault.

Lick Creek Syncline.—The Lick Creek Syncline, not previously named or described, is a short shallow fold in Lee District, Mingo County, lying just east of the Williamson Anticline. The basin first becomes perceptible along Pigeon Creek, two miles south of Burch, and extends southwestward to Lick Creek, the course of which it closely follows to the Pike County, Kentucky, Line, at the mouth of the creek, only four miles of its length being in West Virginia. Nothing is known of its course through Pike County. The rise of the rocks is gentle on both sides of the axis. The surface geology is that of the Kanawha Series, the elevation of the Campbell Creek (No. 2 Gas) Coal being less than 625 feet above sea level along the axis.

Unconformities.

The surface rocks of Logan and Mingo present no extensive unconformities. There are numerous places where single beds of sandstone or coal beds are locally absent, causing frequent variations of interval between the different formations, but these localities are not extensive enough to need description and are usually due to shifting currents rather than to irregular subsidence or elevation of land areas in the ancient Appalachian Basin.

Faults.

Warfield Fault.—The Warfield Fault of White[8] is a vertical displacement of the rock strata that occurs in western Mingo, extending for 17 miles from Kermit eastward to the head of Mud Fork of Island Creek in Logan County and being immediately south of the Warfield Anticline. The line of the fault crosses Tug Fork 0.8 mile southeast of Kermit Station and one-eighth mile west of Middle Burning Creek. Its course eastward is closely parallel to that of the anticline, the distance between the axis of the anticline and the line of the fault being about one-half mile. It crosses Marrowbone Creek three-fourths mile west of Pickletub Branch and is plainly visible at a log slide on the south side of the creek. It appears again on Pickletub, Barkcamp, Neely, Cub, and Messer Branches of Marrowbone, in all of which its effect on the rocks is plainly to be seen by their disturbed and broken condition. It was also traced to the head of Marrowbone Creek by the violent displacement of the Chilton Coal along that stream. It crosses the tunnel line of the Norfolk and Western Railroad just south of Dingess where great difficulty has been experienced in constructing and maintaining the tunnel on account of the broken rocks. It crosses Twelvepole Creek 0.6 mile southeast of Dingess where absolute proof of its existence is to be found in the fact that while all the rocks are plainly dipping southeastward, the fossiliferous Dingess Limestone is at a lower elevation north of the fault than on the south side. Evidences of it here were also reported by coal miners who formerly worked in the main heading of the Mingo Block Coal Company, which started near the top of the anticline and was driven southeastward in the Dingess Coal along the dip of the rocks toward the line of the fault. On the head of Mud Fork the Campbell Creek (No. 2 Gas) Coal shoots rapidly upward, but no break in the rocks is perceptible. No evidence of the fault was found on Crawley Creek or on the Guyandot River where conditions were favorable to observe it.

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[8] I. C. White, Vol. II(a), W. Va. Geol. Survey, pp. 380 and 402; 1908.

The greatest displacement of the fault is at Kermit on Tug Fork where the break in the rocks is plainly visible at the watch box along the Norfolk and Western Railroad. Here there is a sheer displacement in the rocks of 100 feet, the strata on the northwest having slid downward. As far as could be determined the hade angle is zero, the fault line being vertical. Careful measurements were made on both sides of the fault to determine the displacement. Just east of the break the Campbell Creek (No. 2 Gas) Coal was formerly mined, level with the railroad grade, but on the west side the coal is below water level and does not appear again until the rise of the rocks brings it up level with the railroad grade in the highway at Lower Burning Creek. The displacement of the strata may be studied here from a cross section A A^1, Figure 3, that was compiled from observations made along the railroad and from the Kermit Section published in Chapter IV. The section shows, on an exaggerated scale, the break of the rocks about one-half mile from Tug Fork, the line of the section being at right angles to the plane line of the fault, and including both the Warfield Anticline and the Coalburg Syncline. The exact location of the section is shown on Maps I and II. Owing to the overlying debris, it was not possible to make a reliable cross section at any other point along the fault, but its effects become less noticeable at each successive exposure east from Kermit until it disappears completely at the head of Mud Fork. Two photographs, Plate V(a), in the Norfolk and Western cut at Kermit, and Plate V(b), where the fault crosses Marrowbone Creek, show the appearance of the rocks.

The fault is shown on Map II in red ink to distinguish it from the green structure contours. South of the fault the pitch of the rocks is much steeper than on the north, making a noticeable change in the line of strike.

The age of the fault is fairly certain. That it was formed since the deposition of the Kanawha Series is certain, since it extends upwards to the hill tops which are at the top of that series. It is also probable that it was formed during the development of the Warfield Anticline. On the north side of the anticline there is no place, except at its junction with the Doane Anticline, where the contours or lines of strike show any marked irregularities. Where the Doane Anticline intersects the Warfield, the lines of strike are only such as would be inevitable at such a place. On the south side of the Warfield Anticline, however, where the fault is situated, the general Southward dip of the rocks toward the Coalburg Syncline has been interrupted decidedly, not only by the formation of the Warfield Fault, but also by the development of three prominent secondary structural features, the Burning Creek and Canterbury Synclines and the Laurel Fork Anticline. It is a significant fact that on the south side of the Warfield Anticline such secondary features do not appear northeast of the Mud Fork region where the fault dies out. It is reasonable to believe that the Warfield Fault line is a development simultaneous with the formation of the Warfield Anticline. Since the Warfield Anticline is a part of the general system of folds that were formed in the Appalachian region in late Permian time, the conclusion is apparent that the Warfield Fault is of late Permian age.

CHAPTER IV.

STRATIGRAPHY—GENERAL SECTIONS.

INTRODUCTION.

The surface rocks of Logan and Mingo Counties are almost wholly contained within the Pennsylvanian or Upper Carboniferous Rocks. There are Quaternary deposits along the streams and a number of oil and gas wells have been drilled down into the Mississippian or Lower Carboniferous, underlying the Pennsylvanian, and some of these have even pierced the upper part of the Devonian. The following standard classification, based on fossil plant and animal life contained in the rocks themselves, includes all the rocks that will be described in the next three Chapters:

Quaternary—Largely present life.

Cenozoic—Recent life forms, absent from Logan and Mingo.

Mesozoic—Less recent life forms, absent from Logan and Mingo.

Paleozoic—Oldest forms of life.

The Pennsylvanian, as well as the Mississippian and Devonian, is contained within the Paleozoic division. Their succession and those subdivisions found on the surface and in borings in Logan and Mingo, in descending order, are as follows:

- Pennsylvanian
  - Conemaugh Series.
  - Allegheny Series.
  - Pottsville
    - Upper, or Kanawha Series.
    - Middle, or New River Series.
    - Lower, or Pocahontas Series.
- Mississippian
  - Mauch Chunk Shales.
  - Greenbrier Limestone.
  - Pocono Sandstones.
- Devonian—Catskill Series.

The Quaternary rocks, represented by unconsolidated clays, gravels, and sand beds, are present only along the streams. They comprise the alluvial soils described by Mr. Latimer in Chapter X. The most recent rocks of Pennsylvanian age found in the two counties are those of the Conemaugh Series. This series, which may have once covered the entire area of Logan and Mingo, has been so nearly eroded that only a few remnants of it remain. It is probable that the lower rocks of this series cap the high knob ½ mile southwest of the corner of Logan, Lincoln and Mingo Counties. It is also probable that they cap several high hills along the Coalburg Syncline, one of them being 1½ miles east of Ethel, another on the high ridge between Island and Whitman Creeks, and others at the head of Whitman Creek. It is certain that the Conemaugh also crops in the hills east of Naugatuck as shown by the geologic section for that place published in this Chapter. Since all these outcrops occur in densely wooded regions, it was not possible to make a thorough study of them. It is quite certain that at no point in the two counties is there enough of the Conemaugh left to hold any of the red beds which should appear about 200 feet above its base. Owing to the difficulty of differentiating these isolated deposits of the Conemaugh, it is not shown separately by outcrop on Map II, but is included under the Allegheny Series.

The lowest surface rocks of the area are represented by the great sandstone member at the top of the Middle Pottsville or New River Series that crops in eastern Mingo County, principally along Tug Fork in the region of War Eagle and Wharncliffe, where it is massive, grayish-white and medium-grained, about 130 feet of it being exposed. It also crops along the Guyandot River, southwest of Gilbert, where about the same thickness is exposed as at War Eagle. The dividing line between the top of this series and the Kanawha Series above is shown on Map II.

Outcrops of the Allegheny Series, as shown by Map II, occur in western Logan and western Mingo, but in most places only the lower members were present, and these mostly disappear in the southeastern part of the area. They will be described in Chapter V.

The Kanawha Series, or Upper Pottsville, constitutes the great bulk of outcropping sediments in Logan and Mingo. These rocks will be described in Chapter VI.

The stratigraphic nomenclature in Logan and Mingo Counties is based largely on work done in Kanawha County in previous years by members of the Survey and other geologists. Previous to 1913, correlations, largely provisional in character, had been made in Logan and Mingo, but before the field work of 1913 was completed, numerous important discrepancies were found and it was thought advisable to do further work in the Kanawha Valley before making up the stratigraphic column for Logan and Mingo. Accordingly a trip three weeks in duration was made by Hennen, Krebs, and Reger, starting at Charleston and going up the Great Kanawha River to Marmet and thence up Lens Creek via Hernshaw and thence southwestward via Short Creek to Peytona on Big Coal River in Boone County, and thence across to Danville via Drawdy and Rock Creeks. From Danville a line of correlations was worked through to Big Creek, Logan County, via Turtle and Big Creeks, and another to Clothier, Logan County, via Little Coal River. By this method all doubt as to the correlations in Boone, Logan and Mingo was removed. The experience gained by Krebs in Boone and by Hennen and Reger in Logan and Mingo during the summer brought to light many new features which were used to good advantage in making this trip, the most important of which was the presence of a stratum of fossiliferous limestone, discovered by Reger at Dingess, Mingo County, a short distance (50′ to 125′) above the Upper Cedar Grove Coal, which was carried continuously from Coalburg, Kanawha County, to the Kentucky State Line on the Tug Fork of Big Sandy River in Mingo County.

During the progress of this work across Kanawha and Boone Counties, a careful revision of the section for Hernshaw, Kanawha County, first measured by Clark and Krebs, and published in Vol. II(a), page 276, and republished by Krebs in the Kanawha County Report, page 93, was made. The revision was based on additional work done in 1913, at Coalburg, Winifrede and on Lens Creek. Since this section was an important aid to the correlation of the measures in Logan and Mingo, it is published here, in revised form, as follows:

Section 1 Mile South of Hernshaw, Loudon District, Kanawha County.

		Thickness Feet.	Total Feet.	
Pennsylvanian (786′)				
Allegheny Series (86′)				
Sandstone, massive, making cliff, East Lynn (1436′ L.)		66	66	66′
Concealed in slope		15	81	
Concealed in bench		5	86	
Kanawha Series (700′)				
Concealed in slope		35	121	
Concealed in bench		0	121	
Concealed in slope		20	141	
Black slate (thickness concealed) (1354′ L.)		...	141	
Concealed		55	196	
Sandstone, massive		5	201	
Coal, hard splint.....1′ 7½″	(6′ 6″) Stockton (1308.8′ L.)	6.5	207.5	141.5′
Slate, gray.........0 2				
Coal, slaty, laminated.2 6				
Coal, hard splint......1 5				
Slate, gray..........0 0½				
Coal, softer..........0 9				
Slate, gray, concealed with sandstone		49	256.5	
Coal (4″), local		0.3	256.8	
Slate, dark brown, with iron ore nodules		4	260.8	
Coal (5″), local		0.4	261.2	
Interval		15.1	276.3	
Coal, cannel...........0′ 4″	(3′ 1″) **Coalburg**	3.1	279.4	71.9
Slate 0 5				
Coal 2 4				
Interval		25	304.4	
Coal, Buffalo Creek		1.9	306.3	
Concealed and sandstone		54.2	360.5	
Coal ....0′ 5″	(3′ 9″) **Winifrede**	3.8	364.3	84.9′
Slate 1 10				
Coal 1 6				
Concealed and sandstone		51	415.3	
Coal, Chilton "A" (1′ 10″)		1.8	417.1	52.8′
Sandstone and concealed		58.8	475.9	
Coal (2′ 3″) Chilton		2.2	478.1	61′
Concealed		33.1	511.2	
Coal ....1′ 0″	(5′ 5″) **Little Chilton**	5.4	516.6	38.5′
Slate and fire clay.....4 0				
Coal 0 5				
Interval		22.6	539.2	
Coal, Hernshaw (2′ 10″)		2.8	542.0	25.4′
Unrecorded		15.3	557.3	
Coal, (5″) Dingess		0.4	557.7	
Unrecorded, containing **Dingess Marine Limestone** and shale fossils		58.5	616.2	
Coal, dirty, Williamson (1′ 2″)		1.2	617.4	75.4′
Unrecorded		40.0	657.4	
Coal ....1′ 2″	(3′ 7″) **Cedar Grove**	3.6	661.0	43.6′
Slate and shale........0 2				
Coal 2 3				

			Thickness Feet.	Total Feet.
Unrecorded			31.0	692.0
Coal, Alma (1' 6")			1.5	693.5
Unrecorded			85.2	778.7
Coal	0' 2¾"	(7' 3½") Campbell Creek or No. 2 Gas	7.3	786.0
Slate	0 3¼			
Coal	3 10½			
Fire clay	0 7½			
Coal	2 3½			

The section, as given above, which is principally of the Kanawha Series, shows these rocks as they exist at their type locality. In Logan and Mingo numerous coals and sandstones not present at Hernshaw or in the Kanawha Valley appear in the series making a great expansion in its thickness. They will be fully described in Chapter VI.

Several carefully measured sections, consisting usually of surface outcrops combined with the records of wells drilled for coal or oil, and showing the entire stratigraphic succession from the Conemaugh down to the Upper Devonian, are published in the following pages.

LOGAN COUNTY SECTIONS.

Chapmanville District.

Chapmanville District, being farthest to the northwest, is in the region where the Allegheny Series has its best development within the two counties and where the underlying Kanawha Series is not so thick as elsewhere. The following section was measured by Reger with aneroid, starting at the top of a high hill in Harts Creek District, 0.7 mile northeast of the common corner of Lincoln, Logan and Mingo Counties, and descending along the road to the mouth of Ivy Branch. Since the section was made on the rise of the rocks, the total section gives a thickness of about 50 feet less than true vertical measurement would show. The openings in coals marked "reported" in the section had fallen shut but are given on the authority of Lewis Maynard, who once thoroughly prospected the hill:

Section at Corner of Logan, Mingo and Lincoln Counties.

Pennsylvanian **(820')**	Thickness Feet.	Total Feet.	
Conemaugh Series (188')			
Sandstone, hard, medium coarse, capping knob, Saltsburg	25	25	
Concealed, mostly shale	70	95	
Sandstone	5	100	
Shale, with streaks of sandstone	60	160	
Concealed and sandstone	28	188	
Allegheny Series (202')			
Coal blossom, streak, Upper Freeport	...	188	188'
Fire clay, white, Bolivar	2	190	
Shale, with iron ore	15	205	
Sandstone, shaly, concealed and shale	60	265	
Concealed in steep bluff, mostly sandstone	50	315	
Shale, gray	7	322	
Coal, slaty..........1' 2" Coal, soft..........1 2 Slate, black.........0 1 Coal, soft............2 0 Coal, semi-splint.....1 11 Slate ....0 0½ Coal, slaty and blocky, reported...2 0 (8' 4½") **Upper Kittanning** 1250' B.	8	330	142'
Concealed	8½	338½	
Coal, reported	1½	340	10'
Sandstone, massive, pebbly, East Lynn	45	385	
Coal, soft.............0' 10" Shale, dark...........0 6 Coal, hard.............0 6 Coal, medium hard...1 0 Coal, hard............1 0 Coal, soft.............1 8 (5' 4") **No. 5 Block** 1190' B.	5	390	50'
Kanawha Series (430')			
Sandstone, massive, Homewood	55	445	
Coal, reported, thickness concealed, Stockton	...	445	55'
Concealed, and steep bluff, mostly sandstone	60	505	
Concealed in bench	25	530	
Concealed and sandstone in bluff	30	560	
Concealed, with coal blossom	13	573	
Concealed	5	578	
Coal, Coalburg (1000' B.) reported	2	580	135'
Sandstone, massive, Lower Coalburg	46	626	
Shale, dark, bituminous	2½	628½	
Coal, Buffalo Creek, thickness concealed, reported	1½	630	50'
Sandstone, massive, Upper Winifrede	39	669	
Coal, Winifrede	1	670	40'
Concealed	20	690	
Sandstone, massive, concealed, and sandstone, massive	79	769	
Coal, slaty, Chilton (810' B.)	1	770	100'
Fire clay and concealed	5	775	
Sandstone, massive, Hernshaw	45	820	
Coal (0' 4"), **Hernshaw** (760' B.)	...	820	50'

In the following section, taken from the Cabell, Lincoln and Wayne Report, page 64, the top portion was measured with aneroid descending a hill north of Big Creek Station by C. E. Krebs. The bottom portion is the record of the Wm. Lucas No. 1 gas well (Map No. 3) by the Pelham Oil & Gas Co., at Big Creek. The correlations have been changed to suit the present knowledge of the Kanawha Series:

Big Creek Section, Chapmanville District.

Pennsylvanian **(1750')**	Thickness Feet.	Total Feet.	
Allegheny Series (55')			
Shale, sandy and concealed	45	45	
Shale, sandy	10	55	
Kanawha Series (1165')			
Sandstone and concealed (Homewood)	90	145	
Sandstone, current bedded (Upper Coalburg)	75	220	
Shale, sandy and concealed (**Coalburg Coal Horizon**)	5	225	225'
Sandstone, (Lower Coalburg)	85	310	
Shale, sandy and concealed	10	320	
Sandstone, (Upper Winifrede)	90	410	
Shale, sandy	5	415	
Sandstone, Lower Winifrede	45	460	
Shale, sandy and concealed	5	465	
Sandstone. coarse, micaceous (Upper Chilton)	65	530	
Shale, sandy and concealed	10	540	
Sandstone, ferruginous (Lower Chilton)	65	605	
Shale, sandy	10	615	
Sandstone, coarse, Hernshaw	40	655	
Shale, sandy and concealed	47	702	
Fire clay and coal (Williamson)	3	705	480'
Sandstone. massive, fine-grained, Upper Cedar Grove	40	745	
Sandstone, flaggy, Lower Cedar Grove	30	775	
Coal and slate (Alma)	5	780	75'
Sandstone, fine-grained, gray, Logan	42	822	
Slate	1	823	
Coal. sulphurous. ....1' 0" } (1' 6") Coal, hard ....0 6 } **Little Alma**	1.5	824.5	44.5'
Slate (0' 4")	0.3	824.8	
Sandstone, limy, fossiliferous	2.0	826.8	
Slate, with iron nodules	2	828.8	
Sandstone, fine-grained, gray (Peerless) to top of well	21.2	850	
Continued by Wm. Lucas No. 1 Well Record (Map No. 3).			
Mud and gravel	13	863	
Coal, Campbell Creek (No. 2 Gas) (supplied from outcrop)	(2)	865	40.5'
Mud and gravel	43	908	

	Thickness Feet.	Total Feet.	
Sand	7	915	
Slate	222	1137	
Sand	28	1165	
Slate	6	1171	
Sand, Lower War Eagle	29	1200	
Coal (Lower War Eagle)	2	1202	337′
Slate	18	1220	
New River and Pocahontas Series (530′)			
Sand (Nuttall)	85	1305	
Slate	8	1313	
Lime	12	1325	
Sand	25	1350	
Lime	10	1360	
Sand	60	1420	
Slate	20	1440	
Coal, Sewell?	6	1446	244′
Slate	9	1455	
Lime	65	1520	
Black lime	15	1535	
Gray sand	135	1670	
Water sand	50	1720	
Slate	3	1723	
Sand	27	1750	
***Mississippian* (408½′)**			
Mauch Chunk Shales (226′)			
Slate	10	1760	
Lime	20	1780	
Slate	20	1800	
Red rock	15	1815	
Lime	15	1830	
Red rock	5	1835	
Slate	3	1838	
Lime	5	1843	
Slate	17	1860	
Lime	10	1870	
Slate	15	1885	
Sandy lime	25	1910	
Slate	20	1930	
Little Lime	30	1960	
Slate	16	1976	
Greenbrier Limestone (175′)			
Big Lime	175	2151	
Pocono Sandstones (7½′)			
Red rock to bottom	7½	2158½	

"Gas in Big Lime between 2051 and 2058 feet. Well completed August 18, 1911."

In the following section, the top portion was measured by Hennen with aneroid descending the hill one-half mile southeast of Chapmanville. The surface measurements connect with the Oscar Ferrell No. 1 well (Map No. 17), drilled by the Castle Brook Carbon Black Company, and is continued by the record of the well:

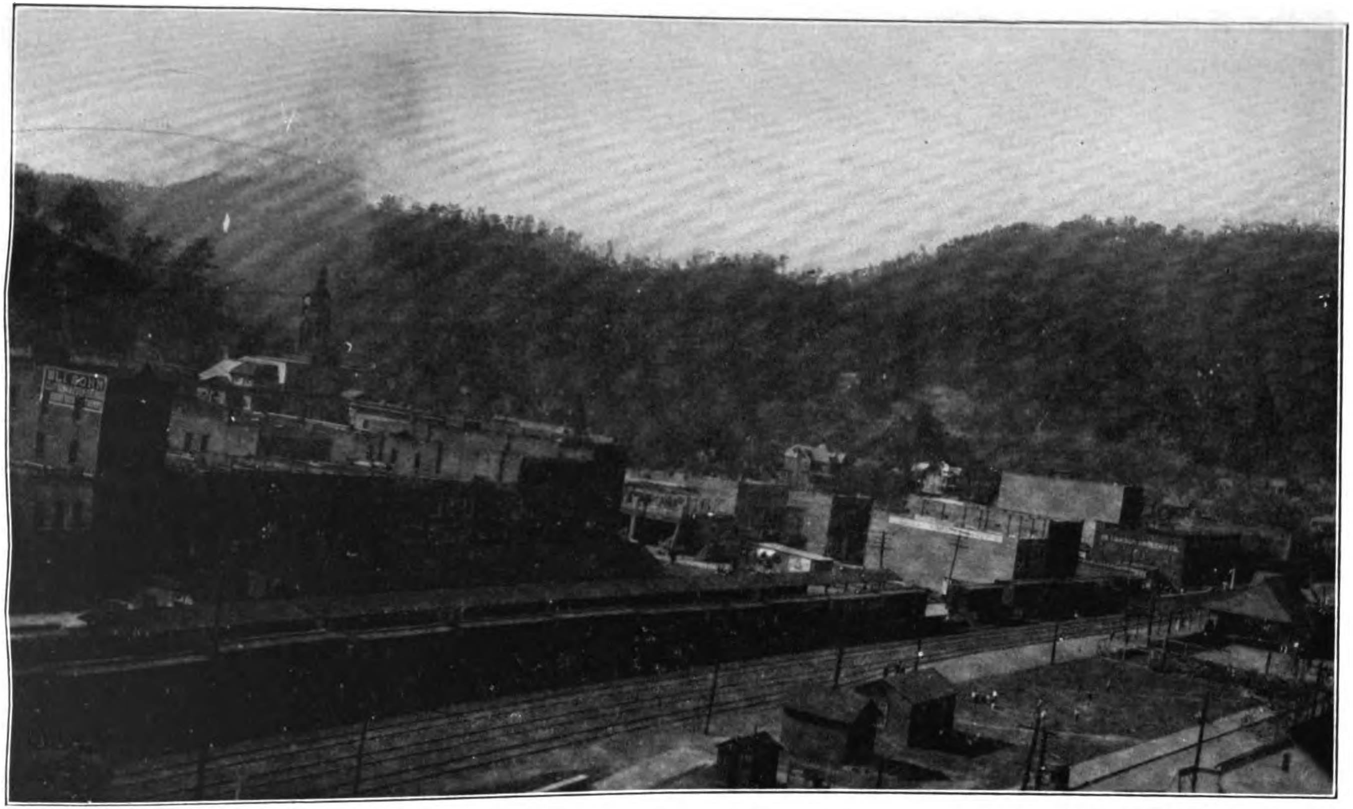

PLATE II.—View of Williamson and topography of the Kanawha Series. (See page 15.)

Chapmanville Section, Chapmanville District.

	Thickness Feet.	Total Feet.
Pennsylvanian (1380')		
Kanawha Series (795')		
Unrecorded and steep bluff	325	325
Concealed along bench	20	345
Concealed	40	385
Sandstone, light-brown, fine-grained, micaceous	30	415
Concealed along bench 975' B.	6	421
Coal, Alma (supplied from outcrop ¼ mi. S. E.)	4	425
Sandstone, slightly flaggy, olive-brown, fine-grained, micaceous, Logan	35	460
Concealed	15	475
Sandstone, fine-grained, flaggy, micaceous, brown	25	500
Concealed along bench	25	525
Sandstone, massive, light brown, fine-grained, forms steep bluff, Brownstown	45	570
Concealed along bench	25	595
Shale, sandy	5	600
Sandstone, massive, gray, mottled with small specks of iron oxide, quarried once on land of Oscar Ferrell, Eagle	45	645
Concealed and shale	15	660
Coal (0' 3") Eagle	0	660
Fire clay shale	3	660
Shale, buff, sandy	67	730
Sandstone, flaggy	10	740
Shale, to top of Oscar Ferrell well No. 1 (17) 655' B.	5	745
Continued by Oscar Ferrell No. 1 Well Record (No. 17 on Map II.)		
Surface	50	795
New River and Pocahontas Series (585')		
Sand, Nuttall, Raleigh, etc	460	1255
Slate	110	1365
Sand and lime	15	1380
Mississippian (290')		
Mauch Chunk Shales (290')		
Red rock	30	1410
Lime shells	15	1425
Red rock cave	20	1445
Slate (6⅝" casing, 720')	100	1545
Lime	60	1605
Slate, black	30	1635
Sand, white (5 bailers of water per hour)	20	1655
Slate, black	15	1670
Greenbrier Limestone (189')		
Lime, black	25	1695
Slate	10	1705
Lime, black	70	1775
Lime, white, (gas 15' in, 30' in, 50' in, and 52' in), to bottom	84	1859

"Gas pressure, 550 lbs.; volume not taken."

Logan District.

Logan District, being farther southeast than Chapmanville, is in a region where the Pottsville Measures are much thicker and the coals are better.

The following section by Hennen was made in the Clothier region, in the northeast corner of Logan County next to the Boone County Line on the waters of Little Coal River. The thicknesses of the various members are much greater than those shown for Big Creek and Chapmanville on the Guyandot River farther west. The top part of the section was made with aneroid descending from the summit of a high hill 1 mile S. 80° W. from the mouth of the Left Fork of Beech Creek northeastward to Core Test No. 7 (52A) of the Boone County Coal Corporation located on the same ridge. The section is continued in this boring to the base of the Chilton Coal and is there continued by the record of the Boone County Coal Corporation Core Test No. 1 (50), located at the mouth of Bend Branch of Spruce Fork of Coal River, one-half mile south of Clothier, which starts 53 feet, hand level measurement, below the outcrop of the same Chilton Coal in the hillside, and in which the top of the Campbell Creek (No. 2 Gas) Coal was found at a depth of 355 feet. From the bottom of the Campbell Creek (No. 2 Gas) Coal, the section is continued by the record of the oil test well (50A) drilled by the Big Creek Development Company on the west side of Bend Branch opposite the core test:

Clothier-Beech Creek Section, Logan District.

Pennsylvanian **(2406')**	**Thickness**		**Total**		
Allegheny Series (205')	**Ft.**	**In.**	**Ft.**	**In.**	
Concealed from top of knob......	5		5		
Sandstone, massive, grayish-white, coarse, pebbly, making prominent cliff, East Lynn............	35		40		
Concealed along steep bluff, probably mostly sandstone...........	25		65		
Concealed along bench............	10		75		
Concealed along steep slope......	15		90		
Concealed along bench (No. 5 Block Coal Horizon............	15		105		105'
Sandstone, buff, medium-coarse. broken, blocky..................	65		170		

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Concealed along steep slope		20		190			
Concealed along bench		15	0	205	0		
Kanawha Series (1406')							
Sandstone, buff, medium-grained, partly concealed, Homewood		110	0	315	0	210'	
Concealed along steep bluff		25	0	340	0		
Concealed and sandstone		35	0	375	0		
Concealed to top of bore hole		15	0	390	0		
Continued in Boone County Coal Corporation Coal Test No. 7 (52A) (1290' L.)							
Surface		14	0	404	0		
Shale		2	0	406	0		
Sandstone		21	0	427	0		
Sandstone		18	0	445	0		
Coal		0	4	445	4		
Shale		13	0	458	4		
Shale		4	8	463	0		
Slate		1	0	464	0		
Coal ....1' 11"	**Coalburg** 1210' L..	6	3	470	3	155'	3"
Bone 0 1							
Coal 0 3							
Bone 0 1							
Coal 0 7							
Coal and bone...0 2							
Slate 0 4							
Coal and slate interlaminated 1 9							
Coal 1 1							
Fire clay		0	10	471	1		
Shale, sandy		16	6	487	7		
Slate		0	10	488	5		
Coal ....1' 4"	**Little Coalburg**	2	10	491	3	21'	0"
Slate 0 6							
Coal 1 0							
Fire clay		1	9	493	0		
Shale, sandy		5	0	498	0		
Slate		1	4	499	4		
Fire clay		1	0	500	4		
Shale, sandy		17	8	518	0		
Slate		1	0	519	0		
Coal ....0' 5"	**Buffalo Creek**..	2	0	521	0	29'	9"
Slate 0 1							
Coal 1 6							
Sandy shale		9	4	530	4		
Shale		8	0	538	4		
Shale		9	0	547	4		
Coal ....1' 8"	....	2	5	549	9	28'	9"
Slate 0 3							
Coal and bone....0 6							
Fire clay		3	2	552	11		
Shale		7	1	560	0		
Shale		0	7	560	7		

		Thickness Ft.	In.	Total Ft.	In.	
Coal and bone... 1′ 0″ Shale ...11 0 Coal and bone... 0 8		12	8	573	3	23′ 6″
Shale		3	0	576	3	
Fire clay		2	0	578	3	
Sandstone	Upper Winifrede	51	4	629	7	
Sandstone		22	8	652	3	
Shale		2	6	654	9	
Coal ... 1′ 9″ Sandy shale.....17 7 Coal ... 0 7	Winifrede	19	11	674	8	101′ 5″
Sandstone		5	11	680	7	
Sandstone		2	0	682	7	
Slate		22	0	704	7	
Coal		0	5	705	0	
Fire clay		3	0	708	0	
Slate		7	0	715	0	
Shale, sandy		3	7	718	7	
Shale, sandy		2	6	721	1	
Coal and bone....0′ 8″ Coal ....1 0 Shale ....0 6 Coal ....0 3 Coal and bone....0 7	Chilton "A".....	3	0	724	1	49′ 5″
Shale		8	0	732	1	
Sandstone ...... 8′ 3″ Sandstone, hard.12 0 Sandstone, with shale streaks.. 9 6 Shale, sandy....11 0 Sandstone ......10 0 Sandstone 14 0	Upper Chilton..	64	9	796	10	
Shale		4	8	801	6	
Slate		0	2	801	8	
Coal ....2′ 5″ Bone ....0 0¼ Coal 4 0	Chilton...	6	5¼	808	1¼	84′ 0¼″
Fire clay, sandstone, and concealed, by hand-level to top of bore hole		52	10¾	861	0	
Continued by Log of Boone County Coal Corporation Coal Test No. 1 (50)						
Surface		14	0	875	0	
Shale		0	6	875	6	
Coal, **Hernshaw**		0	4	875	10	67′ 8¾″
Shale		3	0	878	10	
Sandy shale		6	0	884	10	
Fire clay		2	3	887	0	
Shale		5	0	892	0	
Sandstone, Naugatuck		53	8	945	8	
Slate		0	4	946	0	
Sandstone, Williamson		19	4	965	4	

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Slate, shaly (Dingess Marine Limestone horizon)		21	8	987	0		
Coal ....0′ 4″							
Bone 0 1½							
Coal 0 1½							
Sandy shale....0 7							
Coal 1 2½							
Bone 0 0½							
Coal 0 3	Williamson	11	3	998	3	122′	5″
Fire clay......1 7							
Shale 5 9							
Coal 0 3							
Bone 0 1							
Coal 0 11							
Fire clay		0	5	998	8		
Shale, sandy		4	4	1003	0		
Sandstone, with shale streaks, Upper Cedar Grove		21	1	1024	1		
Slate, shaly		11	8	1035	9		
Slate, black		12	8	1048	5		
Bone ....0′ 0½″							
Coal 1 3							
Bone 0 0½	Cedar Grove	2	2¼	1050	7¼	52′	4¼″
Slate 0 3¼							
Coal 0 7							
Fire clay		0	5	1051	0¼		
Shale, sandy		3	2¾	1054	3		
Sandstone ...... 0′ 6″							
Shale, sandy.... 0 8							
Sandstone 9 4							
Sandstone 2 2							
Shale, sandy..... 0 9							
Sandstone 3 2	Middle Cedar Grove Sandstone	32	5	1086	8		
Shale, sandy..... 0 9							
Sandstone 15 1							
Coal, Lower Cedar Grove		0	8	1087	4	38′	8¾″
Shale		4	3	1091	7		
Shale, with sandstone streaks		12	5	1104	0		
Shale		3	6	1107	6		
Shale		1	5	1108	11		
Coal and bone, laminated ......0′ 2″							
Coal 4 0	Alma	4	2	1113	1	25′	9″
Fire clay		0	6	1113	7		
Unrecorded		102	5	1216	0		
Coal, Campbell Creek (No. 2 Gas) upper bench		2	0	1218	0	104′	11″
Continued in record of Boone County Coal Corporation No. 1 Oil Test (50A)							
Slate		8	0	1226	0		
Sand		175	0	1401	0		
Slate and shells		210	0	1611	0		
New River and Pocahontas Series (795′)							
Salt sand, first		270	0	1881	0		

	Thickness		Total	
	Ft.	In.	Ft.	In.
Slate	60	0	1941	0
Salt sand, second (hole full of water at 1160')	435	0	2376	0
Slate	30	0	2406	0
***Mississippian* (1493')**				
Mauch Chunk Shales (405')				
Limestone, black	5	0	2411	0
Slate, black (cave, bad, 1530'-1547')	17	0	2428	0
Lime, black	10	0	2438	0
Red rock (caves)	3	0	2441	0
Slate and shells	20	0	2461	0
Sand	20	0	2481	0
Lime, black	25	0	2506	0
Slate, white (falls in some)	26	0	2532	0
Sand, black (Maxton), (hole full of water, 1700')	94	0	2626	0
Red rock	10	0	2636	0
Black, limy formation	95	0	2731	0
Red, limy formation	10	0	2741	0
Slate, black	10	0	2751	0
Black, limy formation	60	0	2811	0
Greenbrier Limestone (200')				
Gray lime......... 45' Black and gray lime ....155 } Big Lime.	200	0	3011	0
Pocono (588')				
Red lime (gas 30' in)	70	0	3081	0
Sand, red, Big Injun	40	0	3121	0
Slate and shells	425	0	3546	0
Shale, brown	24	0	3570	0
Sand, Berea (gas show in top)	29	0	3599	0
***Devonian* (3')**				
Catskill Series (3')				
Slate to bottom (total depth 2721')	3	0	3602	0

The record of the oil well showed a coal 4 feet thick at 130 feet, which was probably the Williamson. It also reports the Campbell Creek (No. 2 Gas) Coal as being 4 feet thick, instead of 2 feet, as given by the core test on the opposite side of Bend Branch, and containing gas and water. The well was abandoned as a dry hole.

The following section, made by Hennen, Reger and Gawthrop, with duplicate hand-level measurement, and arranged in descending order, gives the rock succession from the top of Rattlesnake Knob triangulation point, 1 mile N. 20° W. from Logan, to the river level, from which it is connected with the record of a well (76) drilled for oil on the Wm. Ellis tract by the Milton Drilling Co., 1 mile southeast from Logan. The well starts at the level of the Alma Coal, but the surface measurements, made at the foot of Rattlesnake Knob, opposite Logan, are used for that portion because they give more details. This record was previously published in Volume II(a), page 296.

The No. 5 Block Coal, at the base of the Allegheny Series, probably belongs about 70 feet below the top of the knob in the partly concealed first member of the section:

Logan Section, Logan District.

		Thickness Feet.	Total Feet.	
Pennsylvanian **(2393')**				
Allegheny (about 70') and Kanawha (about 1583') Series:				
Sandstone, partly concealed, capping Rattlesnake Knob		110	110	
Sandstone, massive.....33.5'	Homewood Sandstone (lower portion)	72	182	
Concealed 16.5				
Sandstone, hard, massive, gray............22				
Concealed, mostly shale, with iron ore nuggets		28	210	
Sandstone, massive, gray, hard ....54'	Great cliff rock .... Upper Coalburg	114	324	
Concealed 3				
Sandstone, massive, gray, hard 57				
Concealed, mostly shale (Coalburg Coal horizon)		19	343	343'
Sandstone, gray, micaceous, medium hard, making cliff, Lower Coalburg		163	506	
Concealed		23	529	
Sandstone, gray, hard, broken		31	560	
Shale, gray, very silicious		16.5	576.5	
Concealed		66	642.5	
Sandstone, massive at top, Upper Chilton		33	675.5	
Concealed, with shale (Chilton Coal horizon)		16.5	692	349'
Sandstone, hard, gray, flaggy, Lower Chilton		119.5	811.5	
Fire clay, silicious		4.6	816.1	
Sandstone, very hard, fine-grained, flaggy, with ripple marks		24	840.1	
Shale, brown, sandy		58.5	898.6	
Sandstone, massive, hard, gray, micaceous		45.5	944.1	
Shale, sandy		5.5	949.6	
Sandstone		4.0	953.6	
Shale, sandy		6.5	960.1	
Sandstone, flaggy........22'	Upper Cedar Grove	40	1000.1	
Sandstone, flaggy, with shale 18				
Shale, dark, finely laminated		12	1012.1	
Coal, semi-splint.......3' 1"	(6' 2") **Cedar Grove**	6.2	1018.3	326.3'
Shale, gray............0 6				
Coal, splint............1 0				
Coal, semi-splint........1 7				

	Thickness Feet.	Total Feet.	
Fire clay, silicious	3	1021.3	
Sandstone, shaly and flaggy, Lower Cedar Grove	12.2	1033.5	
Coal, Alma "A"	0.3	1033.8	15.5′
Fire clay	3	1036.8	
Shale, very silicious	29	1065.8	
Coal, Alma	4	1069.8	36′
Shales, sandy	7.5	1077.3	
Sandstone, medium-grained, micaceous, gray, Logan	59.5	1136.8	
Sandstone, flaggy, Peerless	34.5	1171.3	
Coal, Campbell Creek "Rider"	0.7	1172.0	102.2′
Fire clay	5	1177	
Shales, sandy, with nodules of iron	26	1203	
Coal, slaty 0′ 6″ Coal, semi-splint 2 5 Slate, gray 0 1 Coal, semi-splint 1 0 (4′ 0″) **Campbell Creek** (No. 2 Gas) 825′ B.	4	1207	35′
Fire clay	1	1208	
Sandstone, massive, Brownstown	46	1254	
Coal, Powellton	1	1255	48′
Shale, sandy	10	1265	
Sandstone, shaly	36	1301	
Continued in Wm. Ellis No. 1 Well (76)			
Slate, black	37	1338	
Lime, (shale) white	10	1348	
Slate, black	50	1398	
Sand, white	120	1518	
Slate, black	35	1553	
Lime (shale), gray	80	1633	
Slate, black	20	1653	
New River and Pocahontas Series (745′)			
Sand, white, Nuttall	205	1858	
Slate, black	60	1918	
Sand, gray	20	1938	
Lime (shale), white	10	1948	
Slate, black	8	1956	
Lime, (shale), dark	22	1978	
Slate, dark	30	2008	
Sand, white, Raleigh, (salt water, 30′ in)	150	2158	
Slate, black	27	2185	
Sand, white (water, 13′ in)	23	2208	
Slate, white	5	2213	
Sand, white (water, 20′ in)	105	2318	
Coal	8	2326	
Sand, white	32	2358	
Slate, white	20	2378	
Sand	20	2398	
***Mississippian* (1240′)**			
Mauch Chunk Shales (322′)			
Lime, black	10	2408	
Slate, black	5	2413	
Red rock	15	2428	
Slate and lime shells, white	30	2458	
Red rock	20	2478	

	Thickness Feet.	Total Feet.
Lime, dark	19	2497
Sand, gray	16	2513
Lime, gray	10	2523
Red rock	15	2538
Sand, white	15	2553
Slate, dark	15	2568
Red rock	20	2588
Slate, dark	10	2598
Red rock (6⅝" casing, 1561')	11	2609
Lime, white	4	2613
Red rock	55	2668
Slate and shales	45	2713
Red rock	7	2720
Greenbrier Limestone (328')		
Lime, white	20	2740
Slate, white	128	2868
Lime, white	180	3048
Pocono Sandstones (590')		
Red rock	30	3078
Slate and lime shells ("Big Injun")	125	3203
Lime, sandy (Big Injun), (little gas, 40' in)	65	3268
Slate and shells, white, (gas in Berea Sand horizon at bottom)	370	3638
***Devonian* (74')**		
Probably Chemung (74')		
Slate and shells, white	25	3663
Shale, brown	29	3692
Sand, gray	14	3706
Slate, white, to bottom	6	3712

The following section, the top portion of which was measured with aneroid by I. C. White descending the hill to Dingess Run, about 1 mile southwest of Ethel, and was published in Volume II(a), page 295, and the lower portion of which is taken from the Dingess-Rum Coal Company's Coal Test No. 1 (68), located on Freeze Fork, 1½ miles southeast of Ethel, exhibits the lower part of the Allegheny and the upper portion of the Kanawha Series:

Ethel Section, Logan District.

	Thickness		Total	
	Ft.	In	Ft.	In.
***Pennsylvanian* (957' 1")**				
Allegheny and Conemaugh Series (364' 4")				
Sandstone, massive, pebbly, pebbles very large (1" in diameter) in lower portion, East Lynn	150	0	150	0
Concealed	90	0	240	0
Coal ("Big Bed") No. 5 Block, in several layers	10	0	250	0
Concealed and shales	20	0	270	0
Coal, splint, Clarion, visible	3	0	273	0
Concealed	5	0	278	0

	Thickness		**Total**	
	Ft.	**In.**	Ft.	In.
Sandstone, massive, Homewood?	75	0	353	0
Coal, splint, Lower Clarion ? visible	1	4	354	4
Concealed	10	0	364	4
Kanawha Series (592′ 9″)				
Sandstone, yellow, massive, Homewood?	100	0	464	4
Coal, splinty, Stockton, once opened, about	4	0	468	4
Concealed	5	0	473	4
Sandstone, flaggy, dull gray, micaceous, with limy layers, Coalburg and Winifrede Sandstones	350	0	823	4
Coal, bright, Chilton "A", once mined, about	2	6	825	10
Concealed and sandstone to Coal Test (68)	26	3	852	1
Continued in Dingess-Rum Coal Co. Coal Test No. 1 (68). Top of hole, 1032′ L.				
Surface	25	0	877	1
Shale	2	7	879	8
Coal, Chilton "Rider"	1	0	880	8
Sandstone	42	11	923	7
Slate	1	3	924	10
Coal 3′ 6″ Slate 0 3 Coal 1 8 } **Chilton**	5	5	930	3
Slate	11	6	941	9
Sandstone, Lower Chilton	3	9	945	6
Coal and bone, Little Chilton	0	6	946	0
Fire clay	3	4	949	4
Sandstone, to bottom	7	9	957	1

It is possible that the great sandstone whose base comes at 353 feet in the above section may be the true Homewood.

The following section, made by Hennen with aneroid descending a high hill on the headwaters of Island Creek, shows the surface rocks in the south end of Logan District:

Oilville Section, Logan District.

On east hillside of Island Creek, 2 miles southeast of Oilville, in drain, 0.6 mile below Conley Branch.

	Thickness	Total	
	Feet.	Feet.	
Pennsylvanian (1125′)			
Allegheny Series (185′)			
Sandstone, massive, grayish-white, capping knob, Upper Freeport	25	25	
Concealed	10	35	
Sandstone, massive, coarse, grayish white, Lower Freeport	40	75	
Coal blossom, Upper Kittanning, and shale, sandy	10	85	
Concealed	30	115	
Coal blossom, heavy, Middle Kittanning (2015′ B.)	5	120	120′
Concealed from bench	22	142	

	Thickness Feet.	Total Feet.	
Coal ....0' 3" Fire clay shale...2 0 Coal ....0 5 Shale, gray........1 0 Coal ....0 4 Shale, gray........0 7 Coal, cannel.......0 6 Coal, splint.......3 6 (8' 7") **No. 5 Block** 1985' B.	9	151	31'
Concealed	32	183	
Coal, Clarion, 1' 6" visible..................	2	185	34'
Kanawha Series (940')			
Concealed and sandstone, massive..........	30	215	
Concealed	58	273	
Sandstone, massive........................	5	278	
Shale	2	280	
Coal, splint....1' 10 " Shale, gray....0 1 Coal, splint....3 2 Bone ....0 2 Coal, splint....0 3½ Shale, dark gray ....0 3½ Coal, splint....3 1 Slate, with coal streaks.0 4 Coal, splint....1 3 (10' 6") **Stockton** .... (1845' B.)	10	290	105'
Fire clay and concealed....................	20	310	
Sandstone, massive, grayish white..........	5	315	
Concealed, mostly sandstone..............	80	395	
Concealed along bench (Coalburg Coal horizon)	10	405	115'
Sandstone, massive, gray and white, forms toad stool figures, Lower Coalburg.......	80	485	
Concealed along bench.....................	30	515	
Sandstone. massive, coarse, grayish white...	40	555	
Limestone. Buffalo Creek, dark, silicious, micaceous, flaggy, with marine fossils—Productus, Chonetes, Derbya................	10	565	160'
Concealed	40	605	
Concealed, slight bench (Winifrede Coal horizon)	10	615	50'
Sandstone, massive, medium-grained, gray, Lower Winifrede.........................	50	665	
Concealed along bench.....................	10	675	
Sandstone, massive, medium-grained, micaceous, gray............................	30	705	
Concealed	120	825	210'
Sandstone, massive, coarse-grained, yellowish-gray, Lower Chilton.................	38	863	
Concealed	2	865	
Sandstone, flaggy, and shale...............	3	868	
Concealed	202	1070	
Sandstone, flaggy, and shale...............	3	1073	

	Thickness Feet.	Total Feet.	
Coal ....0' 0½" Shale, gray.....0 9 Coal, splinty....5 3 } (6' 0½") Cedar Grove .... (1056' B.)	6	1079	254'
Fire clay and concealed (hand-level measure)	17	1096	
Coal, splint.......2' 0" Coal, semi-splint..2 1 } (4' 1") Lower Cedar Grove (1035' B.)..	4	1100	
Fire clay, flaggy sandstone, and shale (hand-level measure)...........................	22	1122	
Coal ....2' 0 " Slate, gray.....0 1½ Coal ....0 9 } (2' 10½") Alma... (1010' B.)	3	1125	46'
Fire clay..................................			

Triadelphia District.

Triadelphia District is situated in the southeast corner of Logan County. No deep wells have been drilled in it for oil or gas, so that there is no knowledge of the Mississippian or Devonian Rocks. In this region there is a great expansion of the measures over those farther northwest along the Guyandot River.

The following section was compiled by Hennen from measurements made along the steep hills northeast of the Guyandot River between Man and Manbar Stations. That portion of the section between the Campbell Creek (No. 2 Gas) and Eagle Coals is by hand-level, measured at Man; the remainder above, by aneroid, at Manbar; and that below the Eagle, with aneroid, on the east hillside of Guyandot River, 3.2 miles southeast of Man:

Manbar-Man Section, Triadelphia District.

***Pennsylvanian* (1580')**	Thickness Feet.	Total Feet.	
Allegheny Series (120')			
Sandstone, grayish-white, coarse, capping knob, ¾ mile northwest of Manbar Station, East Lynn..............................	45	45	
Concealed	25	70	
Sandstone, massive, grayish-white, coarse, East Lynn................................	35	105	
Concealed (probably horizon of No. 5 Block Coal)	15	120	120'
Kanawha Series (1460')			
Sandstone, massive, grayish-white, and yellowish-gray, coarse, Homewood...........	25	145	
Concealed	20	165	

	Thickness Feet.	Total Feet.	
Sandstone, massive, grayish-white, medium-grained, Homewood	45	210	
Concealed along bench	10	220	
Sandstone, flaggy, micaceous	50	270	
Concealed, black slate blossom and fire clay (**Stockton Coal horizon**)	10	280	160′
Sandstone, flaggy, fine-grained, broken, to bench	40	320	
Concealed	15	335	
Sandstone, flaggy, grayish-white, forms cliff 50′, Upper Coalburg?	50	385	
Sandstone, medium-grained, gray, streaked with iron oxide, forms great cliff, Lower Coalburg?	80	465	
Concealed, mostly shale	50	515	
Concealed and **coal blossom on bench (Buffalo Creek)**	5	520	240′
Sandstone, massive, yellowish-gray, medium-grained, forms cliff, Upper Winifrede	60	580	
Sandstone, shaly	20	600	
Shale, sandy, buff	15	615	
Concealed	5	620	
Coal blossom, Winifrede	0	620	100′
Concealed along bench	5	625	
Sandstone, massive top, flaggy bottom, forms great cliff, Lower Winifrede	70	695	
Concealed	5	700	
Sandstone, flaggy, micaceous	15	715	
Concealed	5	720	
Sandstone, massive, yellowish-gray, forms cliff, Upper Chilton	25	745	
Concealed	20	765	
Coal blossom, heavy, Chilton, with 4″ of dark flint fire clay	5	770	150′
Concealed	5	775	
Sandstone, massive, yellowish-gray, medium-grained, micaceous, Lower Chilton	35	810	
Concealed	35	845	
Sandstone, flaggy, dove-colored, fine-grained	35	880	
Concealed, mostly sandy shale	40	920	
Sandstone, flaggy, and shale, sandy	75	995	
Concealed	15	1010	
Coal blossom, Cedar Grove	0	1010	240′
Sandstone, massive, Middle Cedar Grove	60	1070	
Concealed (holding horizon of **Lower Cedar Grove Coal**, bench at top)	23	1093	
Sandstone, shaly, and shale, sandy	13	1106	
Concealed (holding horizon of **Alma Coal**)	3	1109	99′
Sandstone, massive, Logan	52	1161	
Concealed	14	1175	
Sandstone, flaggy	9	1184	
Concealed	29	1213	
Sandstone, massive, Peerless	46	1259	
Shale	0.5	1259.5	
Coal, Campbell Creek (No. 2 Gas)	5.5	1265	156′

	Thickness Feet.	Total Feet.	
Continued from Man Station exposure.			
Fire clay and sandy shale	10	1275	
Sandstone, massive top, flaggy bottom, Brownstown	57	1332	
Concealed, mostly dark sandy and flaggy shale	56.5	1388.5	
Shale, bluish-gray, sandy	10	1398.5	
Coal, slaty....0' 5" Shale, sandy....0 10 Coal, slaty....0 3 **Matewan**	1.5	1400.0	135'
Shale, sandy, and sandstone, shaly......4' to	0	1400	
Sandstone, massive, grayish-white, medium coarse, Matewan	36	1436	
Shale, black, with fossil plants	1.5	1437.5	
Coal, gas, good, breaks in small 1" cubes, Eagle "A"	1.5	1439	39'
Sandstone, fine-grained, bluish-gray, massive, **Eagle**	25	1464	
Shale, black, laminated	5	1469	
Coal, gas....0' 4" Shale, gray....1 3 Coal, gas....0 7 Shale, gray....0 6 Coal, gas....0 4 **Eagle**	3	1472	33'
Shale	1	1473	
Sandstone, bluish, to railroad grade at Man Station, 75 yards southeast of	6	1479	
Concealed and black shale, with marine fossils, Eagle	100	1579	
Limestone, Eagle, dark gray, flinty fracture, exposed at edge of public road, 3.2 miles S. 10° E. of Man Station	1	1580	108'

MINGO COUNTY SECTIONS.

Harvey District.

Harvey District is situated in the northwest corner of Mingo, where the northwestward thinning of the Pottsville Rocks, and the gradual thinning of the coals, greatly reduce the intervals between the different formations. Many of the coals and sandstones of the southeastern parts of Logan and Mingo are not represented in the district.

The following section was measured by Reger with aneroid, starting on a high hill 0.8 mile south of Breeden Station and continuing down to the mouth of Breeden Creek. Since the rocks are dipping northwestward, the total thickness shown is about 25 feet in excess of true vertical measurement. The two lower members of the section are from the record of a water well drilled by the Norfolk and Western Railroad Company at the mouth of Breeden Creek, as reported by the contractor:

Breeden Section, Harvey District.

	Thickness Feet.	Total Feet.	
***Pennsylvanian* (821')**			
Allegheny Series (125')			
Concealed, mostly shale	35	35	
Sandstone, massive, making cliff at top, quartz pebbles, East Lynn	80	115	115'
Concealed in bench (No. 5 Block Coal horizon)	10	125	
Kanawha Series (696')			
Steep bluff, with sandstone, Homewood	120	245	
Concealed in bench	10	255	
Steep bluff, with sandstone, Upper Coalburg	127½	382½	
Shale, gray	3	385½	
Coal, gas 1' 3" Slate, dark 0 4 Coal, semi-splint 1 4 Slate, dark, with some coal 1 0 Coal, splint 1 8 (5' 7") Coalburg (1185' B.)	5½	391	276'
Concealed, with sandstone	110	501	
Coal, thin streak, Winifrede	...	501	110'
Concealed and sandstone	55½	556½	
Shale, gray	4	560½	
Coal, Chilton "A" (0' 6")	0½	561	60'
Fire clay shale	2	563	
Shale, sandy	15	578	
Sandstone, massive	48	626	
Sandstone, shaly	10	636	
Slate, black	0½	636½	
Coal 1' 2" Slate, gray 0 2 Coal 1 4 (2' 8") Little Chilton? 917' B.	2½	639	78'
Fire clay, concealed and sandstone	12	651	
Coal (0' 4") Hernshaw	0	651	12'
Sandstone, concealed, and sandstone, massive	60	711	
Coal (1' 10") Dingess, upper split	1	712	61'
Fire clay shale	3	715	
Sandstone, massive	5	720	
Shale, gray	3	723	
Coal (0' 6") Dingess, lower split	0½	723½	11½'
Fire clay shale	4½	728	
Sandstone, massive	1	729	
Shale, dark	21	750	
Limestone, hard, silicious and ferriferous, with marine fossils, Dingess, to bed of Breeden Creek	1	751	27½'
Slate, in N. & W. R. R. well	50	801	
Sandstone, to bottom of well	20	821	

The following section, the top portion of which was made by Reger with aneroid, starting on the hill ½ mile southwest of Dingess, and the bottom of which is taken from the record of the Guyandot Land Association gas well (103), published in Volume II(a), page 299, gives the succession from the lower portion of the Allegheny Series nearly to the base of the Mississippian:

Dingess Section, Harvey District.

Pennsylvanian (1908′)			Thickness Feet.	Total Feet.	
Allegheny Series (65′)					
Sandstone, massive, capping knob, East Lynn			55	55	
Concealed in bench			10	65	
Kanawha Series (1041′)					
Sandstone, gray, soft, massive, quarry rock, Homewood			40	105	
Concealed			110	215	
Sandstone, massive, hard, gray, Upper Winifrede			50	265	
Concealed in bench			16	281	
Coal (supplied from opening in tunnel hill) Winifrede, reported			4	285	285′
Sandstone, massive, Lower Winifrede			60	345	
Concealed, in bench			10	355	
Concealed in steep bluff			79	434	
Coal	1′ 8″				
Slate, black	1 0				
Coal, block	1 0				
Coal, slaty	1 6				
Coal, semi-splint	1 6	(10′ 11″) **Chilton** (Supplied from G. W. Damron mine)	11	445	160′
Shale, gray	0 3				
Coal	0 2				
Shale, gray	0 4				
Slate, bony	0 1				
Coal, semi-splint	3 5				
Concealed in steep bluff, with sandstone			70	515	
Coal blossom (supplied from opposite hill) Hernshaw			...	515	70′
Concealed			54	569	
Sandstone, massive, Naugatuck			10	579	
Coal, semi-splint	1′ 6 ″				
Slate, black	0 1½				
Coal, semi-splint	1 1	(3′ 3″) **Dingess** (1020′ L.)	3	582	67′
Slate, black	0 0½				
Coal	0 6				
Sandstone, massive, Williamson			10	592	
Fire clay and concealed			5	597	
Sandstone			4	601	
Shale, gray, with iron ore nodules			3	604	
Limestone, ferriferous, with marine fossils, Dingess			1	605	23′
Continued in Guyandot Land Association well record (103)					

	Thickness Feet.	Total Feet.	
Slate, black	2	607	
Sand, white	46	653	
Coal, Cedar Grove	1	654	49'
Slate, sandy	78	732	
Slate, black	80	812	
Sand, white	10	822	
Slate, white	65	887	
Sand, white	130	1017	
Slate, black	48	1065	
Slate, white	41	1106	
New River and Pocahontas Series (802')			
Sand, white, Nuttall	473	1579	
Slate, black	11	1590	
Coal	6	1596	942'
Slate, black	4	1600	
Sand, white (salt water)	308	1908	
***Mississippian* (780')**			
Mauch Chunk Series (74')			
Slate, black	22	1930	
Limestone, gray	6	1936	
Red rock	4	1940	
Limestone, gray	2	1942	
Slate, white	4	1946	
Red rock	2	1948	
Slate, white, sandy	8	1956	
Slate, white	26	1982	
Greenbrier Limestone (176')			
Limestone, gray, shelly, show of oil	51	2033	
Limestone, white, hard	125	2158	
Pocono Sandstones (530')			
Sand, red, hard, gas, Big Injun	94	2252	
Slate, white, sandy	64	2316	
Slate, white	50	2366	
Sand, gray and dark	66	2432	
Slate, white, shelly	50	2482	
Slate, white	180	2662	
Slate, white, shelly, to bottom	26	2688	

The section shows a westward thinning of 582 feet in the Kanawha Series between Logan and Dingess, or at the rate of 50 feet per mile. There is also an unusually small amount of the Mauch Chunk Shales, but the New River and Pocahontas Series are nearly as thick as at Clothier and Logan.

The following section, measured by I. C. White with aneroid descending a hill on Pawpaw Branch of Laurel Fork of Pigeon Creek, 0.6 mile southeast of Hale Station, was published in Volume II(a), page 420. The interval between the Coalburg and Chilton Coals seems excessive and is possibly too great, as another aneroid measurement between these two formations by Reger in 1913 gave only 285 feet instead of 328, as given in the section. A more complete study of the Kanawha Formations, as will be explained in the description of that series in Chapter VI, caused several changes to be made in correlations:

Hale Section, Harvey District.

			Thickness Feet.	Total Feet.
Pennsylvanian **(825')**				
Allegheny Series (122')				
Sandstone and shales with bench below middle, East Lynn			120	120
Coal blossom, bright, No. 5 Block			2	122
Kanawha Series (703')				
Shales and concealed			90	212
Sandstone, massive, pebbly, grayish-white big cliffs, Upper Coalburg			115	327
Shale, gray			3	330
Coal, hard	0' 8"	(7' 0") **Coalburg**	7	337
Bone, cannelly	0 8			
Coal, splinty	4 4			
Slate, gray	0 6			
Coal, hard	0 10			
Concealed and sandstone to bench			50	387
Sandstone and concealed			100	487
Coal, splint, reported, **Winifrede**			3½	490½
Concealed and massive sandstone, Lower Winifrede			60	550½
Shale, gray			10	560½
Coal, fire clay parting, Chilton "A", about			3½	564
Concealed and sandstone, yellow, Upper Chilton			90	654
Coal, hard	1' 5"	(11' 3") **Chilton**	11	665
Shale	0 8			
Coal, splint	1 8			
Coal, soft	0 1			
Coal, hard	2 11			
Coal, softer	0 5			
Fire clay	0 2			
Coal, soft	0 2			
Fire clay shale	1 1			
Coal, hard, splinty	2 8			
Concealed and massive sandstone			130	795
Coal blossom, Dingess			...	795
Concealed (should contain Dingess Limestone) and sandstone to water level			30	825

Warfield District.

Warfield District, lying southwest of Harvey, is in the same region of minimum thickness of the Kanawha Series for the two counties.

The following section is compiled from surface measurements made by Hennen and Reger, combined with portions of the records of the Hiram Stepp No. 409 (Map No. 137) and Hiram Stepp No. 327 (Map No. 138) wells, by the United Fuel Gas Company. The section starts at the top of a hill on the Wayne-Mingo County Line one-half mile northeast of Kermit, 100 feet above the level of the Stepp No. 409 well. Below the top of this well surface outcrops of the coals, which were not given in the well record, are inserted in their proper places. The measurements between the Little Chilton and the Campbell Creek (No. 2 Gas) Coals were made along the Norfolk and Western Railroad near the Warfield Fault. That portion of the section taken from Stepp No. 327 (Map No. 138) is given on the authority of S. W. Perry, Superintendent of the J. R. Shanklin Coal Company. The section shows that the Coalburg Coal is locally absent, being cut out by the 106 feet of sandstone starting 114 feet from the top of the section. The same condition is shown by other wells near by. The Cedar Grove Coal is also absent, having disappeared along with the westward thinning of the Kanawha Series. The Powellton Coal, reported in the section, is not shown by other well records in the same region:

Kermit Section, Warfield District.

	Thickness Feet.	Total Feet
Pennsylvanian (1570')		
Kanawha Series (1105')		
Sandstone, massive, capping knob, Homewood	25	25
Concealed, prospected for coal but none found	30	55
Sandstone, massive, medium-coarse, to level of gas well	45	100
Continued in Hiram Stepp No. 409 well record, (Map No. 137)		
Shale	14	114
Sandstone, massive, Upper and Lower Coalburg	106	220
Slate	20	240
Coal streak, Winifrede (supplied from outcrop)	...	240
Sand	85	325
Slate, black	15	340
Sand, Upper Chilton	40	380
Coal, Chilton	5	385
Slate, white	25	410
Continued by surface measurements.		

	Thickness Feet.	Total Feet.
Sandstone, shaly	8	418
Coal, Little Chilton, (0' 10")	1	419
Shale, buff	3	422
Sandstone, bluish-gray, quarried at west portal of Burning Creek tunnel, Hernshaw	44.5	466.5
Shale, dark gray	2.5	469
Coal, Hernshaw (1' 10")	1	470
Shale and concealed	23	493
Sandstone, yellowish-brown, fine-grained	5	498
Concealed and shale	16	514
Sandstone, light gray and brown, medium-grained, massive, with streaks of coal at base, Williamson	22	536
Shale, dark, with iron ore nuggets	8.5	544.5
Sandstone, shaly, with **marine fossils, Dingess Limestone (755' B.)**	0.5	545
Shale, dark, with iron ore nuggets	20	565
Coal, splint, Williamson, (1' 2")	1	566
Shale, sandy	10	576
Sandstone, massive, light gray, medium-grained	15	591
Concealed	9	600
Sandstone, massive	26	626
Shale, sandy, dark, with iron ore nodules	11	637
Limestone, in lenses, "turtleback" forms	2	639
Shale, dark, iron ore nuggets	11	650
Coal, slaty 0' 3" Shale, gray 0 7 Coal 0 2 **(1' 0") Alma.**	1	651
Shale, dark gray	3	654
Sandstone, massive, Logan	3	657
Shale, dark, flaggy and sandy	9	666
Coal 0' 3" Shale, gray 0 4 Coal, splint 1 1 **(1' 8") Little Alma**	2	668
Shale, gray and concealed	5	673
Coal, slaty (0' 2") Campbell Creek "Rider"	...	673
Shale, dark, gray	17	690
Coal, semi-splint 0' 10" Coal, laminated with slate 0 3 Coal, semi-splint 2 7 Bone 0 1½ Coal, semi-splint 0 9½ **(4' 7") Campbell Creek (No. 2 Gas)**	5	695
Continued in Hiram Stepp No. 327 well record (Map No. 138).		
Sand, Brownstown	45	740
Slate, white	65	805
Coal, Eagle	5	810
Slate, white	50	860
Slate, black	45	905
Sand, white	25	930
Continued in Hiram Stepp No. 409 (Map No. 137).		
Lime	20	950

	Thickness Feet.	Total Feet.
Slate, white	30	980
Sand, Upper and Lower Gilbert	60	1040
Slate, black	65	1105
New River and Pocahontas Series (435′)		
Sand, Salt (Nuttall), (water at 1195′ in well or 1295′ in section)	235	1340
Limestone	55	1395
Sand	102	1497
Slate, black	18	1515
Sand	25	1540
***Mississippian* (1020′)**		
Mauch Chunk Shales (253′)		
Slate, white	10	1550
Lime	20	1570
Red rock	30	1600
Sand and shells	30	1630
Red rock	60	1690
Sand and shells	30	1720
Slate	10	1730
Lime, black	21	1751
Pencil cave	12	1763
Sand, close and hard	30	1793
Greenbrier Limestone (192′)		
Black lime 37′ Red lime 155 } Big Lime	192	1985
Pocono Sandstones (575′)		
Red rock	10	1995
Sand, Big Injun	30	2025
Slate and shells	275	2300
Slate, black	30	2330
Shale, brown	216	2546
Sand, Berea	14	2560
Slate (*Devonian*) to bottom	3	2563

The well was completed October 3, 1912, and produces gas from the Big Lime.

Hardee District.

Hardee District is situated southeast of Warfield and is in a region where the rocks of the Kanawha Series are better developed and the coals are thicker and more numerous.

The following section, the upper 830 feet of which was made by Reger with aneroid, the next 70′ 10″ of which was made by Hennen with hand-level, and the lower portion of which is from the record of the M. H. Waldron Core Test No. 1 (154) furnished the Survey by the Morrow Prospecting Co., through S. W. Perry, Superintendent of the J. R. Shanklin Coal Co., starts at a higher stratigraphic level than any other made within the two counties. The section starts at the top of a high hill 1.5 miles N. 70° E. of Naugatuck and continues down to near the mouth of Den Branch of Pigeon Creek, 0.6 mile northeast of Naugatuck, where the core test was drilled. The hill was once thoroughly prospected for coal by Dr. M. H. Waldron, owner of the property, who is authority for the thickness of the coals marked "Reported", where the prospects had fallen shut, and through whose assistance they were located in the woods. A thorough search was made for the Dingess Limestone above the core test on Pigeon Creek, but it was not found. It belongs in the concealed interval between the Dingess and Williamson Coals. The section was made on the strike and therefore represents true vertical measurement:

Naugatuck Section, Hardee District.

			Thickness Feet.	Total Feet.	
Pennsylvanian (1091′ 1″)					
Conemaugh Series (45′)					
Sandstone, massive, capping knob	10′	Mahoning ...	45	45	
Concealed	15				
Sandstone, massive	20				
Allegheny Series (245′)					
Concealed			25	70	
Sandstone, massive, Lower Freeport			65	135	
Coal, Upper Kittanning, "reported"			19	154	154′
Fire clay and concealed			51	205	
Sandstone, massive, East Lynn			75	280	
Concealed			5	285	
Coal	2′ 6″	**No. 5 Block** (Reported 5′ 0″).. 1222′ B.	5	290	136′
Slate	0 1				
Coal	2 5				
Kanawha Series (801′ 1″)					
Sandstone, massive, Homewood			100	390	
Coal, streak, Stockton			...	390	100′
Concealed			25	415	
Sandstone, massive, Upper Coalburg			65	480	
Coal, slaty	0′ 6½″	(9′ 3″) Coalburg ...... 1021′ B.	9	489	99′
Coal, soft	1 4				
Slate, soft	0 0½				
Coal	0 3½				
Slate, gray, soft	0 3				
Coal, semi-splint	0 10½				
Coal, bony	0 4				
Coal, splint	1 8				
Slate, black, bony	1 11				
Coal, splint, reported	2 0				
Concealed and sandstone in bluff			25	514	

		Thickness Feet.		Total Feet.		
Coal ....2' 0"	Little Coalburg (Reported 5' 2").. 991' B.	5		519		30'
Sandstone 0 8						
Coal 2 6						
Concealed and sandstone in bluff		136		655		
Coal, soft....2' 0"	Chilton "A" (Reported 3'10") 851'B.	4		659		140'
Coal, cannel....1 10						
Concealed and sandstone, Upper Chilton, in bluff		43		702		
Coal, soft....0' 9"	(7' 1") Chilton 801' B.	7		709		50'
Coal, semi-splint.0 11						
Coal, splint....1 8						
Shale 2 6						
Coal 1 3						
Shale and concealed		81		790		
Sandstone, massive, Naugatuck		40		830		
		Ft.	In.	Ft.	In.	
Slate, black, hard		0	6	830	6	
Coal, bony, local		0	10	831	4	122' 4"
Fire clay and shale, with fossil plants		26	6	857	10	
Coal, semi-splint..0' 8"	Dingess upper split 650' B.	1	9	859	7	28' 3"
Slate, dark....0 1						
Coal, semi-splint..1 0						
Shale and concealed		14	0	873	7	
Coal, splint....0' 6"	Dingess lower split 635' B.	1	3	874	10	15' 3"
Fire clay....0 6						
Coal, splint....0 3						
Concealed (should contain Dingess Limestone)		11	0	885	10	
Shale, sandy		4	2	890	0	
Coal ....0' 11"	Williamson .... 618' B.	1	10	891	10	17' 0"
Slate, gray....0 2						
Coal 0 3						
Slate, gray....0 4						
Coal 0 2						
Shale, sandy, with iron ore nuggets to level of Pigeon Creek		16	0	907	10	
Continued in M. H. Waldron No. 1 core test (154). (Well starts about 620' B.; first 18' of depth given from surface exposures above).						
Sand rock		1	2	909	0	
Slate		9	0	918	0	
White sand rock		0	6	918	6	
Sandy slate		6	6	925	0	
Slate		16	0	941	0	
Sandy slate		5	0	946	0	
Dark sand rock		6	0	952	0	
Sandy slate		1	10	953	10	
Slate		0	4	954	2	
Coal, Cedar Grove (555' B.)		1	0	955	2	63' 4"
Fire clay		2	0	957	2	

		Thickness		Total		
		Ft.	In.	Ft.	In.	
White sand rock..2' 0" Sandy slate......0 6 White sand rock..1 6	Middle Cedar ... Grove	4	0	961	2	
Slate		0	2	961	4	
Coal, Lower Cedar Grove (548' B.)		0	6	961	10	6' 8"
Fire clay............................		1	0	962	10	
White sand rock..................		2	0	964	10	
Sandy slate........................		1	0	965	10	
Dark sand rock..................		4	9	970	7	
Coal ....0' 3" Fire clay........1 6 Coal ....0 2 Parting ....0 3 Coal ....0 1 Sandy slate......4 0 Slate ....2 0 Coal ....0 4 Parting ....0 2 Coal ....0 4 Parting ....0 4 Coal ....0 5 Parting ....0 10 Coal ....0 5 Parting ....0 11 Coal 0 3	**Alma** ... 527' B.	12	3	982	10	21' 0"
Slate		3	5	986	3	
White sand rock, Logan and Peerless		67	11	1054	2	
Sandy slate......................		6	0	1060	2	
Coal ....1' 9 " Parting ....0 11 Coal 2 7½	**Campbell Creek** (No. 2 Gas) 445' B.	5	3½	1065	5½	82' 7½"
Slate		20	4	1085	9½	
Coal, Powellton.........(422' B.)		2	7½	1088	5	22' 11½"
Slate		1	0	1089	5	
Dark sand rock to bottom (total depth of hole 201' 1")..........		1	8	1091	1	

The following section was measured by Reger with aneroid, in descending order, starting at the top of a high hill 1.5 miles S. 60° E. of Myrtle and continuing down to Trace Fork of Pigeon Creek:

Myrtle Section, Hardee District.

	Thickness Feet.	Total Feet.	
Pennsylvanian (1040')			
Allegheny Series (275')			
Concealed, upper portion may be Conemaugh	150	150	
Coal, thickness concealed, Upper Kittanning	...	150	150'
Concealed	124	274	
Coal No. 5 Block (1540' B.)................	1	275	125'

				Thickness Feet.	Total Feet.	
Kanawha Series (765')						
Sandstone, massive, Homewood				80	355	
Concealed				5	360	
Sandstone, massive				15	375	
Concealed				15	390	
Sandstone, massive				30	420	
Concealed				10	430	
Sandstone, massive, Upper Coalburg				32	462	
Shale, gray, with coal streaks	0'	9 "	**Coalburg** 1350' B.	3' 1"	465	190'
Coal, semi-splint	0	8½				
Slate	0	0½				
Coal	0	4				
Slate, black	0	5				
Coal	0	10				
Concealed				340	805	
Coal blossom, Little Chilton (1010' B.)				0	805	340'
Concealed				185	990	
Limestone, silicious, Dingess (824' B.)				1	991	186'
Shale, sandy				14	1005	
Slate, black, Williamson Coal				0	1005	14'
Concealed				10	1015	
Sandstone, massive, to Trace Fork, Upper Cedar Grove				25	1040	

Lee District.

Lee District lies southeast of Hardee and is in a region where the southeastward thickening of the measures has greatly increased the intervals between the coals. The following section was measured by Reger with aneroid, starting at the top of a high hill 1.1 miles south of Ragland between Upper and Lower Curry Branches of Rockhouse Fork of Pigeon Creek and going down Upper Curry Branch to its mouth. The section connects with the United Thacker Coal Company Coal Test No. 1 (Map No. 156). The record of this drill hole should give valuable information on the Campbell Creek (No. 2 Gas) and other coals under drainage, but representatives of the Coal Company refused to give the record to the Survey, saying that the test had not been made by reliable parties:

Ragland Section, Lee District.

	Thickness Feet.	Total Feet.
***Pennsylvanian* (1035')**		
Allegheny Series (110')		
Sandstone, capping knob	25	25
Concealed in bench	5	30
Sandstone	45	75

	Thickness Feet.	Total Feet.	
Concealed in bench	35	110	
Kanawha Series (925')			
Sandstone and concealed	40	150	
Concealed in steep bluff	55	205	
Coal blossom, at prospect opening, Stockton, (1645' B.)	...	205	205'
Concealed in steep bluff	113	318	
Coal prospect, Coalburg (1525' B.) (fallen shut) (reported 7' 0")	7	325	120'
Concealed in bluff	70½	395½	
Coal prospect, Buffalo Creek (1450' B.) (fallen shut, reported 4' 6")	4½	400	75'
Steep bluff containing sandstone	160	560	
Concealed	55	615	
Slate, black, in bench, Chilton "A"	...	615	215'
Sandstone, Upper Chilton	40	655	
Concealed in bench (**Chilton Coal horizon**)	10	665	
Sandstone, Lower Chilton	45	710	
Concealed in bench	10	720	
Sandstone, Hernshaw	65	785	
Concealed	80	865	
Sandstone, massive, Naugatuck and Williamson	73	938	
Coal ....1' 0" Slate ....0 2 Coal ....0 10 (2' 0") **Williamson** 910' B.	2	940	325'
Shale and concealed	5	945	
Sandstone. massive, Upper Cedar Grove	40	985	
Shale, sandy, to United Thacker Coal Co., Coal Test No. 1 (156)	15	1000	
Shale	2	1002	
Coal, Cedar Grove Rider (1' 0")	1	1003	
Shale, sandy	17½	1020½	
Coal, soft............1' 7" Coal, semi-splint......1 8 Slate, black..........0 0½ Coal, splint..........1 2½ Coal, slaty...........0 6 (4' 7") **Cedar Grove** (825' B.)	4½	1025	85'
Fire clay	2	1027	
Sandstone	5	1032	
Shale, to Rockhouse Fork	3	1035	

In the following section, the top portion above the Upper Coalburg Sandstone was measured with aneroid by I. C. White and Hennen, starting at the top of a high knob 0.8 mile southeast of Chattaroy, on the south side of Buffalo Creek, and was published in Volume II(a), page 309. The succeeding portion down to the base of the Alma Coal was measured by Hennen with hand-level on the opposite side of Buffalo Creek. The lower portion is the record of the Buffalo Land Co. No. 1 gas well (Map No. 160) by the Floyd Oil and Gas Company, located about 1 mile up Buffalo Creek, northeastward from the base of the measured section. There is an interval of unmeasured strata between the upper and lower portions that is estimated at 15 feet from the known interval of 100 feet between the Alma and Campbell Creek Coals along Buffalo Creek:

Chattaroy Section, Lee District.

			Thickness Feet.	Total Feet.	
Pennsylvanian (2410′)					
Allegheny Series (110′)					
Sandstone, grayish-white, massive, coarse, from top of knob, East Lynn			100	100	
Concealed			10	110	
Kanawha Series (1515′)					
Concealed			65	175	
Sandstone and concealed			75	250	
Coal blossom, Stockton (1390′ B.)			...	250	250′
Concealed			20	270	
Sandstone, massive, Upper Coalburg			65.2	335.2	
Coal, splint	1′ 4″	(4′ 10¼″) **Coalburg** ... 1300′ L.	4.8	340	90′
Slate, dark, gray, 0′ 0½″ to	0 1				
Coal, gas, soft	0 6				
Slate	0 0¼				
Coal, splint	2 11				
Sandstone, massive, Lower Coalburg			80.4	420.4	
Coal splint	2′ 1″	(4′ 7½″) **Buffalo Creek**.. 1215′ L.	4.6	425	85′
Coal, gas	0 3				
Coal, splint	1 11				
Shale, gray	0 1½				
Coal, slaty	0 3				
Concealed and sandstone			46	471	
Concealed			52	523	
Sandstone, massive			5	528	
Concealed			42	570	
Sandstone, massive, Upper Chilton			26	596	
Concealed (should contain **Chilton Coal**)			21	617	
Slate, buff, sandy			5	622	
Sandstone, massive, Lower Chilton			23.6	645.6	
Coal	0′ 8″	(1′ 5″) **Little Chilton** .... 993′ L.	1.4	647	222′
Fire clay	0 3				
Shale, gray	0 2				
Coal	0 4				
Shale, sandy, buff			11	658	
Sandstone, massive, medium-grained, micaceous, yellowish-gray, Hernshaw			21	679	
Coal, blossom, Hernshaw			1	680	33′
Concealed			2	682	
Sandstone, fine-grained			13	695	
Shale, gray			1	696	
Coal, local			1	697	17′
Fire clay			2	699	
Sandstone, massive, coarse, light-gray, Naugatuck			19	718	

		Thickness Feet.	Total Feet.	
Coal ....0' 7"	**(8' 0")**			
Sandstone and shale...7 3	**Dingess**	8	726	29'
Coal 0 2	914' L.			
Sandstone, flaggy, with shale layers, plant fossils, Williamson........................		46	772	
Limestone, silicious, with plant fossils, Dingess		1	773	
Shale, sandy, flaggy and sandstone, flaggy, fine-grained		31.2	804.2	
Coal ....0' 0¾"				
Shale, gray.....0 0¼	**(3' 10") William-**			
Coal, splint.....2 0	**son, Upper Bench**	3.8	808	82'
Coal, gas.......0 3	832' L.			
Shale, gray.....0 3				
Coal, splint.....1 0				
Fire clay...................................		10.5	818.5	
Coal, Williamson, Lower Bench......(0' 6")		0.5	819	11'
Sandstone, massive, coarse-grained, Upper Cedar Grove............................		38	857	
Shale		5.7	862.7	
Iron ore....................................		0.3	863	
Shale, sandy..............................		10	873	
Concealed (should contain **Cedar Grove Coal**, near top)..............................		19	892	
Sandstone, massive bottom, shaly top, Middle Cedar Grove.......................		21	913	
Concealed (should contain **Lower Cedar Grove Coal**)..............................		13	926	
Shale		8	934	
Sandstone, massive, Lower Cedar Grove...		33.5	967.5	
Coal, slaty......0' 5"				
Coal 0 10				
Coal 0 4	**(2' 6") Alma**......	2.5	970	151'
Bone 0 1	670' L.			
Coal 0 10				
Concealed		15	985	
Continued by Buffalo Land Co. Gas Well No. 1 (No. 160 on Map II). Elevation of top, 700' L.				
Gravel		35	1020	
Sandstone, Peerless........................		10	1030	
Slate		35	1065	
Coal, Campbell Creek (No. 2 Gas).........		95	1070	
Sand, Brownstown, (hole full of water at 90')		95	1165	
Slate		6	1171	
Sand		14	1185	
Slate (10" casing, 207')....................		75	1260	
Sand		25	1285	
Slate		75	1360	
Sand		25	1385	
Slate		50	1435	
Sand		50	1485	
Slate		50	1535	
Sand		50	1585	
Slate		5	1590	

	Thickness Feet.	Total Feet.
Sand	5	1595
Slate	10	1605
Sand	20	1625
New River and Pocahontas Series (785')		
Sand, salt, (Nuttall), gas, 640'; hole full of water, 775')	200	1825
Slate	80	1905
Sand (8¼" casing, 940'; 2 bailers water, 1000')	180	2085
Coal, (Davy?)	5	2090
Sandstone (hole full of water, 1130')	320	2410
Mississippian (1151)		
Mauch Chunk Shales (305')		
Lime shells (6" casing, 1700')	305	2715
Greenbrier Limestone (200')		
Big Lime	200	2915
Pocono Sandstones (646')		
Red shale	77	2992
Sand, Big Injun (gas, 2007'; estimated at 250,000 cu. ft. daily)	20	3012
Slate shells	517	3529
Berea Grit	32	3561
Devonian (300')		
Slate shells to bottom	300	3861

The following section was made by Hennen with aneroid in descending from the top of a high hill at the head of Dick Williamson Branch, 1.4 miles northeast of Rawl and continuing down to Tug Fork at the mouth of the branch 0.2 mile northwest of Rawl. Spirit-level measurements between the coals were made by N. H. Manakee, Mining Engineer, of Williamson:

Rawl Section, Lee District.

Pennsylvanian (1276')	Thickness Feet.	Total Feet.	
Allegheny Series (115')			
Sandstone, shale, and concealed, from summit of knob	30	30	
Sandstone, massive medium-grained ..30' Concealed, probably sandstone ..10 Sandstone, massive, medium-grained ..35 East Lynn (This sandstone is pebbly 1 mi. S. E.)	75	105	105'
Concealed	10	115	
Kanawha Series (1161')			
Concealed and shale	65	180	
Sandstone, flaggy, shaly and micaceous	25	205	
Concealed	40	245	
Sandstone, massive	2.4	247.4	

	Thickness Feet.	Total Feet.	
Shale, gray	3	250.4	
Coal, splint.....2' 0" Slate, gray.....0 1 Coal, splint.....2 4 Coal, slaty......0 7 Coal, splint....2 1 Slate, gray.....0 1¾ Coal, splint.....0 5 (7' 7¾") Stockton (1682' L.)	7.6	258	153'
Concealed	15	273	
Sandstone, shaly	4	277	
Shale, sandy	5.3	282.3	
Coal, semi-splint........2' 4" Slate, black, with coal streaks ....1 8 Coal, splint............1 8 (5' 8") Stockton, lower bench (1654' L.)	5.7	286	
Shale and concealed	8.3	294.3	
Sandstone, massive, yellowish-brown, coarse, pebbles at base, forms great cliff, Upper Coalburg	70	364.3	
Coal, gray, splint...2' 9" Bone ....0 1½ Coal, splint.........0 11 Bone ....0 1½ Coal, splint..........0 9 (4' 8") Coalburg (1571' L.)	4.7	369	111'
Fire clay	4	373	
Sandstone, massive, medium-grained, buff	40	413	
Concealed (probably holds Little Coalburg Coal)	9	422	
Sandstone, massive, grayish-brown, soft, medium-grained, Lower Coalburg	35	457	
Coal, splint...........2' 6" Shale, gray, coaly streaks ....0 6 Fire clay shale........1 1 Coal, gray, splint.....3 11 Buffalo Creek (1475' L.)	8	465	96'
Sandstone, concealed, and sandstone, flaggy.	45	510	
Concealed and shale	9.5	519.5	
Limestone, silicious, lenticular	0.5	520	
Shale and concealed	24	544	
Limestone, dark, gray, hard, brittle, with marine fossils, Buffalo Creek	1	545	80'
Concealed	40	585	
Concealed and hsale along bench (Winifrede horizon)	10	595	50'
Sandstone, massive, coarse and friable top, fine-grained at bottom, Upper and Lower Winifrede	55	650	
Concealed along bench	10	660	
Sandstone, massive, brown, micaceous, fine-grained, with limy layers (Upper Chilton)	25	685	
Concealed on slope	30	715	
Concealed along bench (Chilton Coal horizon)	15	730	135'
Sandstone, massive top, brown, micaceous, with limy layers at bottom, Lower Chilton	75	805	

	Thickness Feet.	Total Feet.	
Concealed	10	815	
Sandstone, flaggy, Naugatuck	45	860	
Concealed and shale along bench	10	870	
Sandstone, massive, brown, Williamson	38	908	
Shale	5	913	
Limestone, gray and hard, lenticular, Dingess, 0' to	1	914	184'
Shale, yellowish, apparent **marine shell** concretions, **ferriferous**	1	915	
Shale, sandy	20	935	
Concealed	27.2	962.2	
Shale, sandy, with iron ore nodules	5	967.2	
Coal, gas, hard..0' 5" Slate, gray.......0 4 Coal, splint.......2 1 (2' 10") **Williamson** .... 970' L.	2.8	970	56'
Slate and concealed	91	1061	
Shale, yellowish-gray	6	1067	
Coal, splinty......3' 0" Slate, shale and sandstone, with coal streaks....7 0 **Coal, splinty**......1 6 **Cedar Grove "Upper Thacker"**.. (Mine fallen shut. Section given by N. H. Manakee) 862' L.	11	1078	108'
Fire clay and sandstone, massive, Middle Cedar Grove	40	1118	
Coal, Lower Cedar Grove ("Lower Thacker") thickness supplied	4	1122	44'
Fire clay	5	1127	
Sandstone, massive, Lower Cedar Grove	26	1153	
Shale	9.7	1162.7	
Coal, gas.............2' 5" Coal, splint, hard......0 10 (3' 3") **Alma** 774' L.	3.3	1166	44'
Shale, gray and sandy	4	1170	
Sandstone, massive, Logan	40	1210	
Shale, dark gray, sandy, with iron ore nodules	4.7	1214.7	
Coal, gas.......0' 2¾" Slate ....0 0¼ Coal, splinty....1 9 Slate, gray.....0 2 Coal, slaty......0 2 (2' 4") **Little Alma**	2.3	1217	51'
Shale, sandy	5	1222	
Sandstone, massive, grayish-white, Peerless	40	1262	
Shale, sandy, iron ore nodules and plant fossils in profusion	10	1272	
Coal ....0' 0½" Shale, gray.......0 6 Coal, gas, hard....0 6½ Coal and black slate, interlaminated . 0 6 Coal, semi-splint...2 5 **Campbell Creek ("Rawl") ("Freeburn")... ("Warfield")** 664' L.	4	1276	59'

The following section was measured by Hennen with aneroid, starting at the top of a high knob 1 mile N. 12° W. from Sprigg and descending southeastward to the mouth of a branch of Tug Fork. The section was made on the rise of the measures, making the intervals slightly less than true vertical measurement would show:

Sprigg Section, Lee District.

Pennsylvanian (1240')	Thickness Feet.	Total Feet.	
Allegheny Series (80')			
Sandstone, broken, from top of knob.......	15	15	
Concealed and shale......................	10	25	
Sandstone, massive, medium-grained, grayish-brown, forming cliff, with pebbly base, East Lynn..............................	35	60	
Concealed, with coal blossom..............	15	75	
Coal blossom, No. 5 Block, and fire clay.....	5	80	80'
Kanawha Series (1160')			
Sandstone, massive, medium-grained, grayish-brown....55' Shale .... 5 Sandstone, massive, medium-grained, micaceous, forms great cliff.................65 } Homewood	125	205	
Concealed	25	230	
Sandstone, flaggy	25	255	
Shale and concealed......................	35	290	
Sandstone, massive at bottom, flaggy at top, Upper Coalburg..........................	37	327	
Concealed	3	330	
Coal blossom, Coalburg (1610' B.)..........	0	330	250'
Concealed	57½	387½	
Coal, splint.....1' 0 " Shale, gray.....0 3 Coal ....0 1½ Shale, gray.....0 8 Coal, splint.....0 6 } (2' 6½") **Buffalo Creek**..... 1550' B.	2½	390	60'
Concealed	95	485	
Sandstone, massive, micaceous, gray, Upper Winifrede	42	527	
Coal, splint....1' 0 " Slate, dark.....0 7 Coal, slaty.....0 8½ Bone, hard, flinty ....0 6 } (2' 9½") **Winifrede** .... 1410' B.	3	530	140'
Fire clay and concealed....................	5	535	
Sandstone, massive, Lower Winifrede.......	27	562	
Shale	2	564	
Coal, gas.........0' 5" Shale, gray.......0 1 Coal, gas.........0 2 } (0' 8") **Chilton "A"**...... 1375' B.	1	565	35'
Sandstone, massive.......................	15	580	
Concealed	265½	845½	
Shale, sandy, buff.........................	10	855½	

	Thickness Feet.	Total Feet.	
Coal, gas......0' 9" Shale, gray....0 3½ Coal, gas......1 11 Shale, gray, coal streaks .....0 11 Coal, cannelly and bony....0 7 (4' 5½") **Williamson** ...... 1080' B.	4½	860	295'
Concealed and shale......................	49	909	
Coal, Cedar Grove Rider (1' 0")...........	1	910	50'
Concealed and shale......................	17½	927½	
Coal, Cedar Grove (1010'B.; reported 2' 6")	2½	930	20'
Concealed	25	955	
Sandstone, massive, Middle Cedar Grove....	25	980	
Concealed	30	1010	
Concealed along bench, **Lower Cedar Grove Coal horizon**..........................	5	1015	
Sandstone, massive........................	10	1025	
Concealed	40	1065	
Shale	11	1076	
Coal, gas..............3' 0" Coal, hard, splint.....0 11 (3' 11") **Alma** 860' B.	4	1080	150'
Concealed	120	1200	
Concealed and coal, **Campbell Creek (No. 2 Gas)** (740' B.)........................	5	1205	125'
Concealed	5	1210	
Sandstone, massive, Brownstown...........	30	1240	

The following section was measured on the Kentucky side of Tug Fork, opposite Sprigg, by I. C. White and Hennen, and published in Volume II(a), page 312. In the present report, the names of the coals are changed to agree with the revised correlation of the Kanawha Series, as explained in Chapter VI. Concerning this section, Dr. White says the following:

> "Southwest from this tunnel (Hatfield) on the Kentucky side of Tug River, a very high knob, called 'Little Coon,' rises to a great elevation, being capped by the great gray sandstones of the Allegheny Series. Mr. S. A. Bedall, President of the Burnwell Coal and Coke Company, has had several of the coal beds in the Kanawha Series opened up between Coon Knob and the Tug River and a section measured here reads as follows:"

Little Coon Knob to Hatfield Tunnel Section.—Pike County, Kentucky, Two Miles and a Half Below Matewan, Mingo County.

	Thickness		Total	
Pennsylvanian (1680' 5")				
Allegheny Series (100')	Ft.	In.	Ft.	In.
Sandstone, grayish-white, coarse......	40	0	40	0
Shales, sandy.......................	10	0	50	0
Sandstone, coarse, pebbly, grayish-white, massive, East Lynn..........	50	0	100	0

	Thickness		Total	
	Ft.	In.	Ft.	In.
Kanawha Series (1580′ 5″)				
Shales and concealed	110	0	210	0
Sandstone, massive, coarse, gray, Lower Coalburg, and concealed	100	0	310	0
Shales, coaly at base	10	0	320	0
Sandstone, coarse, yellow, and concealed	110	0	430	0
Sandstone, gray, massive	60	0	490	0
Coal, Chilton "A"	1	0	491	0
Sandstone, massive, gray, Upper Chilton	60	0	551	0
Coal, Chilton	1	0	552	0
Concealed and massive sandstone to base of great cliff, Hernshaw	110	0	662	0
Shales, gray, sandy	70	0	732	0
Sandstone, massive	40	0	772	0
Coal ....1′ 0″ Fire clay........0 4 Coal ....1 6 Fire clay........0 4 Coal and clay...1 10 **Williamson**	5	0	777	0
Concealed	55	0	832	0
Coal, Cedar Grove ("Upper Thacker") splint	4	0	836	0
Concealed, sandstones and shales	100	0	936	0
Concealed	30	0	966	0
Sandstone, massive, micaceous, Lower Cedar Grove	20	0	986	0
Coal, Alma	3	0	989	0
Fire clay and concealed	5	0	994	0
Sandstone, massive, Logan and Peerless, and concealed	130	0	1124	0
Shales, sandy	10	0	1134	0
Coal and bone.1′ 1″ Coal, softer...1 8 Coal, splint...2 2 **Campbell Creek (No. 2 Gas) ("Warfield")**	4	11	1138	11
Shales, sandstone, and concealed	70	0	1208	11
Coal, Powellton ("Hatfield Tunnel")	1	6	1210	5
Shales	5	0	1215	5
Sandstone, massive	15	0	1230	5
Shales, sandy, to railway track at east end of Hatfield Tunnel	20	0	1250	5
Concealed	19	0	1269	5
Coal, Matewan (supplied by Hennen)	1	0	1270	5
Concealed and sandstone to level of Tug River	10	0	1280	5
Interval estimated to Middle Pottsville or New River Series	400	0	1680	5

"The thick coals at the top of the Kanawha Series in the two previous sections (Chattaroy and Williamson of Logan-Mingo Report) appear to have thinned away south-eastward to small and insignificant beds, since after much prospecting, Mr. Bedall has been unable to find them, although Coon Knob passes high above their horizons and is capped with the Allegheny Sandstones. The interval down to the top of the Lower Pottsville (New River Series) is only an estimate, and it may be either too great or too small."

In the section as here published, the top of the Kanawha Series has been placed 110 feet higher than in Volume II(a) to make it harmonize with the Rawl Section where the upper coals are present and there is no question as to their identification. Since the publication of Volume II(a), a gas well has been drilled on Buffalo Creek near Chattaroy, 7 miles northwest from Coon Knob where the Kanawha Series is 1515 feet thick. In the Chattaroy Section, the interval from the Campbell Creek (No. 2 Gas) Coal to the base of the Kanawha Series is 555 feet and in the Coon Knob Section as here published the same interval is 541 feet. It is possible that this interval should be increased to 600 feet as there is a gradual southeastward thickening of the various Kanawha formations.

Williamson District.

Williamson District is a small area co-extensive with Williamson City that was formerly a part of Lee District and is situated along Tug Fork southwest of Lee.

The following section was measured by I. C. White and Hennen with aneroid, starting at a high knob on the watershed between South Fork of Buffalo Creek and Williamson Creek, 1.8 miles northeast of Williamson, and continuing down Williamson Creek to Tug Fork, and was published in Volume II(a), page 310. In the present report, the correlations of the coals have been changed to agree with the revised classification of the Kanawha Series as published in Chapter VI.

Williamson Section, Williamson District.

Pennsylvanian **(1321' 1")**	Thickness		Total	
Allegheny Series (175')	Ft.	In.	Ft.	In.
Sandstone, hard at top, yellow and softer below	30	0	30	0
Sandstone, coarse, grayish-white, massive	80	0	110	0
Concealed and sandstone	60	0	170	0
Sandstone, with hard limy layer	5	0	175	0
Kanawha Series (1146' 1")				
Concealed and sandstone, Homewood	140	0	315	0
Shale, gray, sandy	5	0	320	0

		Thickness Ft.	In.	Total Ft.	In.
Coal ....2′ 6″	Stockton	5	4	325	4
Slate, dark....0 4					
Coal, reported.2 6					
Concealed and great cliff of sandstone, Upper Coalburg....................		100	0	425	4
Coal, splint.......1′ 8″	Coalburg ...	5	6	430	10
Coal, bony........0 2					
Coal, splint.......1 8					
Coal, reported....2 0					
Concealed and massive sandstone, Lower Coalburg....................		100	0	530	10
Coal ....4′ 0″	Buffalo Creek	6	2	537	0
Slate, gray........0 2					
Coal, visible......2 0					
Concealed and sandstone, on Williamson Creek..........................		260	0	797	0
Coal, blossom, Chilton...............		...	..	797	0
Concealed and sandstone............		200	0	997	0
Coal, splint.......1′ 0″	Williamson ..	4	10	1001	10
Shale, gray.......0 3					
Coal, hard........2 4					
Shale, gray.......0 3					
Coal, soft.........1 0					
Concealed and sandstone.............		160	0	1161	10
Coal, Alma, upper bench.............		3	0	1164	10
Shale and sandstone..................		15	0	1179	10
Coal ....1′ 3″	Alma, lower bench	5	9	1185	7
Shales 3 0					
Coal 1 6					
Sandstone, massive, Logan...........		50	0	1245	7
Shales and concealed................		10	0	1195	7
Shales, blue, sandy..................		10	0	1255	7
Coal and clay, Little Alma...........		1	0	1256	7
Shales		5	0	1261	7
Sandstone, massive, visible to N. & W. Ry. track, Peerless, a short distance above Williamson..................		25	0	1286	7
Interval, estimated, to Campbell Creek Coal, near bed of Tug Fork.........		30	0	1316	7
Campbell Creek (No. 2 Gas), Coal, probably		4	6	1321	1

Magnolia District.

Magnolia District lies southeast of Lee, along Tug Fork and is in the region of southeastward thickening of the Kanawha Series.

The following section was measured by I. C. White and Hennen with aneroid, down a high hill at Matewan on Tug Fork, and was published in Volume II(a), page 314. As in the preceding sections from that volume, the names of the coals are changed where necessary to conform with the more detailed information concerning them:

Matewan Section, Magnolia District.

Pennsylvanian (1601′)	Thickness Feet.	Total Feet.
Kanawha Series (1601′)		
Concealed and massive, gray sandstone....	25	25
Shales, sandy..............................	10	35
Sandstone, grayish-white, coarse, massive, Upper Coalburg..........................	55	90
Concealed (should contain Coalburg Coal)..	30	120
Limy layer in sandstone..................	1	121
Sandstone, flaggy and massive, Lower Coalburg	90	211
Coal, blossom, cannel lumps on surface, Buffalo Creek................................	...	211
Concealed, with limy, silicious layer at 30′ below top..............................	140	351
Coal, blossom, Winifrede....................	...	351
Concealed	80	431
Coal, large blossom, Chilton "A"...........	...	431
Concealed	35	466
Sandstone and concealed...................	30	496
Sandstone, great cliff, massive, yellowish, **Lower Chilton**...........................	50	546
Shales and concealed......................	30	576
Sandstone, flaggy and massive.............	40	616
Concealed, shales and sandstone............	65	681
Shales, dark green, marine fossils, Dingess Limestone, (supplied by Hennen)..........	5	686
Coal ....0′ 10″ Shale, gray, coal streaks ....0 7 Coal ....0 1 Shale, gray......0 1 Coal, bony.......0 1 Coal, splinty.....1 9 (3′ 5″) **Williamson** (Supplied from 1913 notes.)	3	689
Fire clay, concealed and sandstone, Upper Cedar Grove.............................	81	770
Coal, soft.........1′ 2″ Coal, splint.......1 3 Shale, gray.......0 1 Coal, soft.........0 6 (3′ 0″) **Cedar Grove**	3	773
Concealed and massive sandstone, Middle Cedar Grove..............................	40	813
Coal, impure, Lower Cedar Grove..........	2	815
Concealed and sandstone, Lower Cedar Grove	90	905
Shales, bluish-gray, rich in fossil plants....	3	908
Coal, Alma................................	4	912
Concealed and sandstone, and sandy shales.	110	1022
Coal, Campbell Creek (No. 2 Gas)..........	...	1022
Concealed and sandstone..................	75	1097
Sandstone, current-bedded.................	15	1112
Shales, sandy..............................	3	1115

	Thickness Feet.	Total Feet.
Coal, Powellton ("Hatfield Tunnel")	1	1116
Shales, sandstone, and concealed to railroad track just below Matewan Station	95	1211
Concealed to Tug River	40	1251
Interval to top of New River Series, estimated	350	1601

In the following section, the surface portion was measured with aneroid by Hennen, starting at the top of a high knob 0.7 mile north of Cedar. The lower portion is from the record of the Jackson Mounts No. 1 well record (Map No. 161), by the Poplar Creek Oil Company, drilled in 1913. The section shows:

Cedar Section, Magnolia District.

	Thickness Feet.	Total Feet.	
Pennsylvanian (2477′)			
Kanawha Series (1025′)			
Unrecorded from top of knob	170	170	
Coal, old opening, closed, Cedar Grove, (1480′ B.)	...	170	170′
Shale	5	175	
Sandstone, massive.......20′ } Middle Cedar Grove	75	250	
Concealed 25			
Sandstone, coarse, brown friable 30			
Concealed and shale	26½	276½	
Coal, Lower Cedar Grove, visible	3½	280	110′
Sandstone, massive, coarse, friable, Lower Cedar Grove	40	320	
Concealed	30	350	
Coal blossom, Alma (1300′ B.)	...	350	70′
Sandstone, massive, cliff rock, Logan	40	390	
Concealed	25	415	
Concealed along bench	10	425	
Sandstone, flaggy, Peerless	25	450	
Concealed	7	457	
Coal, digging, Campbell Creek (No. 2 Gas) (1190′ B.)	3	460	110′
Concealed, mostly shale	105	565	
Sandstone, massive, forming cliff	75	640	
Coal along slight bench	15	655	
Sandstone, massive, forming cliff	25	680	
Concealed	45	725	
Slate, shaly and shale	10	735	
Coal blossom, Little Eagle (915′ B.)	...	735	275′
Concealed	13	748	
Sandstone, shaly, and shale	3	751	
Coal ....0′ 0½″ } (3′ 8″) **Cedar** 895′ B.	4	755	20′
Shale, gray....0 0½			
Coal, gas......0 10			
Coal, splint....0 8			
Coal, gas......2 1			

	Thickness Feet.	Total Feet.	
Sandstone, massive, Grapevine	40	795	
Concealed with shale	30	825	
Coal, Lower War Eagle (795' B.) (1' 6")	1½	826½	71½'
Shale	2½	829	
Sandstone, massive, Upper Gilbert and concealed to top of well (161)	58	887	
Continued by Jackson Mounts No. 1 Well Record (161)			
Silt	35	922	
Sand, white	8	930	
Coal 3' Sand, white 16 Coal 5 **Glenalum Tunnel**	24	954	
Sand, Lower Gilbert	65	1019	
Coal, Gilbert	6	1025	
New River and Pocahontas Series (1452')			
Sand, Dotson	362	1387	
Slate	40	1427	
Sand	150	1577	
Slate	6	1583	
Sand	404	1987	
Coal, show	...	1987	
Sand	100	2087	
Slate	30	2117	
Sand	360	2477	
***Mississippian* (1377')**			
Mauch Chunk Series (1377')			
Red rock	110	2587	
Lime	30	2617	
Slate	70	2687	
Sand, Princeton Conglomerate (?)	180	2867	
Slate	30	2897	
Sand	90	2987	
Unrecorded to bottom	867	3854	

Stafford District

Stafford District is situated in the southeast corner of Mingo County at the corner of the three states of West Virginia, Virginia and Kentucky. Here the Kanawha Series has its maximum development for Logan and Mingo Counties. The southeastward rise of the rocks has elevated the upper coals far above the hill tops so that only the lower coals remain, but along Tug Fork in this region, the upper portion of the New River Series, or Middle Pottsville, appears above drainage, as described in the introduction to this Chapter.

The following section, compiled from aneroid measurements by Hennen, starting with the top of a high knob at the head of Turkey Creek, 2.8 miles northeast of War Eagle and continued by observations along Turkey Creek and down the steep hillside to Tug Fork 0.2 mile west of War Eagle, shows the surface rocks in the southeastern corner of the two counties. No borings have been made to test the lower strata in this region, although it is possible that commercial coals of the New River Series may be found:

War Eagle Section, Stafford District.

				Thickness Feet.	Total Feet.	
Pennsylvanian (1238′)						
Kanawha Series (1108′)						
Unrecorded from top of knob				100	100	
Shale, buff, with iron ore nodules				4	104	
Coal, gas	4′	7″	(9′ 1″) **Cedar Grove**	9	113	113′
Shale, gray, soft 0½″ to	0	0				
Coal, gray splint, hard, reported	4	6				
Concealed				53½	166½	
Sandstone, blocky				3	169½	
Shale, sandy and flaggy, with iron ore concretions				3½	173	
Coal, semi-splint	1′	4″	(5′ 0″) **Lower Cedar Grove.**	5	178	65′
Bony splint	0	2				
Coal, splinty	3	1				
Bony splint, very hard	0	5				
Concealed				209	387	
Sandstone, massive, Peerless				15	402	
Coal, gas	0′	3 ″	(5′ 2½″) **Campbell Creek (No. 2 Gas).** (Locally—“Upper War Eagle”)	5	407	229′
Coal, with thin black slate laminations	0	6				
Coal, gas	2	4				
Slate, dark, gray	0	1½				
Coal, splinty	1	2				
Coal, gas	0	10				
Shale, gray				0½	407½	
Concealed and sandstone				212½	620	
Slate, black, full of plant fossils, 0″ to				4	624	
Coal	0′	7 ″	(8′ 2½″) **Eagle** (Locally, “Middle War Eagle”).	8	632	225′
Slate, bony	0	0¼				
Coal	0	10				
Slate, bony	0	0¼				
Coal, gas, hard	0	5				
Coal, gas, soft	0	11				
Shale, gray, soft, 2″ to	3	0				
Coal, gas	2	5				
Slate				1	633	
Coal, soft, 1″ to 2½″				0	633	
Sandstone, massive, Bens Creek				30	663	
Coal, gas, soft	1′	2″	(2′ 9″) **Bens Creek.**	3	666	34′
Shale, gray, with coal streaks	0	3				
Coal, gas	0	6				
Coal, slaty	0	10				

	Thickness Feet.	Total Feet.	
Concealed	128	794	
Shale, black, mostly concealed, Eagle	21	815	
Limestone, dark, gray and hard, Eagle	1	816	
Shale, black, with marine fossils in profusion, brachiopods and pelecypods, Eagle	3	819	
Slate, black	5	824	
Concealed, mostly black slate	5	829	
Slate, black	10	839	
Sandstone, blocky	10	849	
Concealed and shale	10	859	
Sandstone, flaggy, blocky, medium-grained, gray and brown, Lower War Eagle	30	889	
Coal, gas 0' 4" Shale, gray 1 0 Coal, gas 2 5 } (3' 9") Lower War Eagle	4	893	227'
Fire clay and concealed	3	896	
Shale, sandy and flaggy, with thin sandstone streaks	30	926	
Concealed	20	946	
Sandstone, massive, gray and white, medium-grained, great cliffs, Upper Gilbert	76	1022	
Coal, gas (0' 11") Glenalum Tunnel	1	1023	130'
Fire clay, concealed and shale	5	1028	
Sandstone, massive, Lower Gilbert	30	1058	
Shale, sandy and flaggy	20	1078	
Concealed and shale	30	1108	
New River Series (130')			
Sandstone, massive, grayish-white, current-bedded, medium-grained, Wharncliffe, (Nuttall?) (Dotson?) to Tug Fork	130	1238	

SUMMARY.

For convenience of reference, the thickness of the stratified rocks in Logan and Mingo Counties, as determined by the sections in this Chapter, is compiled in the following table, which shows the thickness of the various series and also gives the total for the Pennsylvanian, Mississippian and Devonian Rocks. A line of dots under a series indicates that the series was not exposed where the section was made. A question mark indicates that the series was present but could not be separated from the series overlying or underlying it. In some instances, the sections show thickness for the series either too great or too small, owing to the dip of the measures where it was made. In many cases they show only a part of a series where the remainder was not exposed. An explanation accompanies each section, where published in full, that gives the peculiar conditions under which it was made:

Table Showing Thickness of the Stratified Rocks in Logan and Mingo Counties.

PLACE MEASURED.	PENNSYLVANIAN						MISSISSIPPIAN				DEVONIAN probably CHEMUNG.	Total Section.
	Conemaugh Series.	Allegheny Series	Kanawha Series	New River Series	Pocahontas Series	Total.	Mauch Chunk Shales.	Greenbrier Limestone.	Pocono Sandstones.	Total.		
Big Creek	....	55	1165	(?)	(?)	1750	226	175	7½	408.5	....	2158.5
Breeden	....	125	696	....	....	821	....	....	....	....	....	821
Cedar	....	....	1025	(?)	(?)	2477	1377	....	....	1377	....	3854
Chapmanville	....	....	795	(?)	(?)	1380	290	189	....	479	....	1859
Chattaroy	....	110	1515	(?)	(?)	2410	305	200	646	1151	300	3861
Clothier	....	205	1406	(?)	(?)	2406	405	200	588	1493	3	3602
Coon Knob	....	100	1580.4	....	....	1680.4	....	....	....	....	....	1680.4
Dingess	....	65	1041	(?)	(?)	1908	74	176	530	780	....	2688
Ethel	(?)	(?)	592.8	....	....	957.1	....	....	....	....	....	957.1
Hale	....	122	703	....	....	825	....	....	....	....	....	825
Kermit	....	....	1105	(?)	(?)	1570	253	192	575	1020	3	2563
Logan	....	70	1583	(?)	(?)	2398	322	328	590	1240	74	3712
Logan-Lincoln-Mingo Counties	188	202	430	....	....	820	....	....	....	....	....	820
Manbar	....	120	1415	....	....	1580	....	....	....	....	....	1580
Matewan	....	....	1601	....	....	1601	....	....	....	....	....	1601
Myrtle	....	275	765	....	....	1040	....	....	....	....	....	1040
Naugatuck	45	245	801.1	....	....	1091.1	....	....	....	....	....	1091.1
Oilville	....	185	940	....	....	1125	....	....	....	....	....	1125
Ragland	....	110	925	....	....	1035	....	....	....	....	....	1035
Rawl	....	115	1161	....	....	1276	....	....	....	....	....	1276
Sprigg	....	80	1160	....	....	1240	....	....	....	....	....	1240
War Eagle	....	....	1108	130	....	1238	....	....	....	....	....	1238
Williamson	....	175	1146.1	....	....	1321.1	....	....	....	....	....	1321.1

CHAPTER V.

STRATIGRAPHY—THE ALLEGHENY SERIES.

GENERAL DESCRIPTION AND SECTION.

The Allegheny Series, a constituent of the Pennsylvanian Rocks, lies between the Conemaugh above and the Kanawha Series below, and varies in thickness from 275 feet in northern West Virginia to less than 150 feet in some parts of Wayne and Lincoln Counties. In Logan and Mingo Counties, the series thickens along the Coalburg Syncline until it appears to attain a thickness occasionally considerably greater than 200 feet, although in such cases the stratigraphic limits of the series are not sharply or certainly defined.

The series is composed usually of massive gray sandstones, interstratified with sandy shales, fire clays, beds of iron ore, coal seams, and occasional thin limestones. The exact composition of the rocks of this series in Logan and Mingo Counties is not clearly known because it is present only in some of the high hill tops where there are no railroad or highway cuts or stream channels in which it may be studied to advantage. The inaccessibility of these deposits has also prevented the coals from being thoroughly prospected. Two large coal beds have been found in it, but no limestones or valuable fire clay deposits were observed. Iron ore in nodular form is present in a few localities. From the observations made, however, it is certain that the rocks of the Allegheny Series in Logan and Mingo Counties contain a much larger percentage of silicious material and a correspondingly smaller percentage of aluminous and calcareous strata than in its typical development in northern West Virginia and western Pennsylvania. The outcrop of the series is shown on Map II.

The following section of the Allegheny Series, compiled from the sections published in Chapter IV, shows the nature of these rocks:

General Section of the Allegheny Series for Logan and Mingo Counties.

	Thickness Feet.	Total Feet.
Coal, Upper Freeport	2	2
Fire clay, Bolivar	5	7
Shale, sandy, with iron ore	15	22
Sandstone, massive, Upper Freeport	20	42
Coal, Lower Freeport	1	43
Shale, sandy	2	45
Sandstone, massive, gray, Lower Freeport	50	95
Coal, Upper Kittanning	8	103
Shale, sandy	10	113
Sandstone, massive, gray, with large quartz pebbles, East Lynn	50	163
Coal, Middle Kittanning	1	164
Shale, sandy	10	174
Coal, No. 5 Block (Lower Kittanning)	10	184
Shale, sandy	20	204
Coal, Clarion	2	206
Sandstone, massive, Lower Clarion	50	256
Coal, Lower Clarion	1	257
Shale, sandy	8	265
Sandstone, massive, Homewood (Top of Kanawha Series)	...	....

The section as given above is not representative of the Allegheny Series in all those portions of the two counties where it is present as many of the members are frequently not found at all. The No. 5 Block Coal usually rests directly upon the top of the Homewood Sandstone. In the vicinity of Ethel, Logan County, along the Coalburg Syncline, two coals and a massive sandstone appear between the No. 5 Block Coal and the Homewood Sandstone, making an increased thickness of the Allegheny Series, in harmony with the great thickening of the Kanawha Series below it.

Local Sections.

Such sections of the Allegheny as were made, showing the series as observed in the two counties, are published in Chapter IV where they were all used in compiling the general sections. Those which show all or a part of the Allegheny Series are as follows: Big Creek (55′), Breeden (125′), Chattaroy (110′), Clothier (205′), Dingess (65′), Little Coon Knob (100′), Ethel (364′?), Hale (122′), Logan (70′), Logan-Lincoln-Mingo County Corner (202′), Manbar (120′), Myrtle (275′), Naugatuck (245′), Oilville (185′), Ragland (110′), Rawl (115′), Sprigg (80′), and Williamson (175′). The thickness of the series as it still remains uneroded on the hilltops is given after the name of each section.

DESCRIPTION OF FORMATIONS.

Upper Freeport Coal.

The Upper Freeport Coal was not observed within the boundaries of the two counties. Its horizon is present only in a few of the high hilltops along the Coalburg Syncline. In the Logan-Lincoln-Mingo County Corner Section, its blossom, as observed by Reger in the high hill in Lincoln County, one-half mile northeast of the county corner, is shown coming 188 feet below the top of the section. The coal was also observed by Reger in Harts Creek District, Lincoln County, at the summit of the road between Laurel Branch of East Fork of Twelvepole Creek and Trace Branch of Kiah Creek, 1.2 miles from the Mingo County Line, where it was once opened just above the road, at an elevation of 1320 feet above sea level, aneroid measurement. As the opening had fallen shut, a section could not be obtained.

The section for Naugatuck in Chapter IV shows 25 feet of concealed interval just below the Mahoning Sandstone, that should contain the Upper Freeport Coal. No attempt was made to prospect this coal when the other seams were opened in the hill below it.

The fact that the Upper Freeport Coal has not been discovered within the two counties, and if it exists at all is only to be found in some of the high hill tops, is sufficient evidence that it is not of commercial importance.

The Bolivar Fire Clay.

The Bolivar Fire Clay, which directly underlies the Upper Freeport Coal and in northern West Virginia is of economic value for brick material, was not observed in the two counties. In the section for the Logan-Lincoln-Mingo County Corner in Chapter IV, this fire clay was observed by Reger in the edge of Lincoln County, where it is 2 feet thick and directly underlies the blossom of the Upper Freeport Coal. Its existence in commercial quantities in Logan and Mingo is not probable.

Upper Freeport Sandstone.

The Upper Freeport Sandstone, which is frequently separated from the Bolivar Fire Clay by 10 to 15 feet of shales containing iron carbonate ore in nodular form, was observed in the two counties only in the section for Oilville, Logan County, published in Chapter IV, where Hennen reports it 25 feet thick, massive, gray, and white, capping a high knob 0.6 mile north of Conley Branch of Island Creek. In the Naugatuck Section, published in Chapter IV, it is possible that the 65 feet of massive sandstone just above the Upper Kittanning Coal may represent a consolidation of both the Upper and Lower Freeport Sandstones.

Lower Freeport Coal.

The Lower Freeport Coal, which underlies the Upper Freeport Sandstone, was not observed within the two counties. In Harts Creek District, Lincoln County, its blossom was observed by Reger along the hill road between Laurel Branch of East Fork of Twelvepole Creek, 1.2 miles from the Mingo County Line, where it is 15 feet below the Upper Freeport Coal and 1305 feet above sea level by aneroid measurement. Like the Upper Freeport above it, the Lower Freeport Coal may be disregarded as a commercial asset of Logan and Mingo.

Lower Freeport Sandstone.

The Lower Freeport Sandstone, which in the northern part of the State is frequently composed of an upper and lower division, of which the upper underlies the Lower Freeport Coal, is present in a few localities in Logan and Mingo. The upper division in these two counties is usually gray and massive, medium coarse, and free from pebbles. In Chapter IV its occurrence is noted in the section at the corner of Logan, Lincoln and Mingo, where it occurs partly concealed in a steep bluff over the Upper Kittanning Coal. In the section for Oilville, Logan County, it is massive, coarse, grayish white, and 40 feet thick, coming just above the Upper Kittanning Coal. In the section for Naugatuck, Mingo County, it is 65 feet thick, and may be a combination of both the Upper and Lower Freeport.

The Upper Kittanning Coal.

What appears to be the Upper Kittanning is the highest coal that is of minable thickness in the two counties. Like the other formations of the Allegheny Series, it crops only in a few high points along the Coalburg Syncline. In Harts Creek District, Lincoln County, one-half mile northeast of the common corner of Logan, Lincoln and Mingo Counties, it was examined and sampled by Reger as follows:

Lewis Maynard Mine, Upper Kittanning Coal.
No. 1 on Map II.

				Feet.	Inches.
1.	Shale, gray				
2.	Coal, slaty	1'	2"		
3.	Coal, soft	1	2		
4.	Slate, black	0	1		
5.	Coal, soft	2	0		
6.	Coal, semi-splint	1	11		
7.	Slate	0	0½		
8.	Coal, slaty and blocky, not mined, (reported by Maynard)	2	0	8	4½

Tidal elevation, 1250', aneroid measurement.

The composition of the sample from Nos. 3, 5 and 6 of section is given under No. 1 in the table at the end of Chapter VIII.*

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*(It is barely possible that this may be the No. 5 Block or Lower Kittanning Coal, instead of the Upper Kittanning.—I. C. W.)

The coal is also reported in Chapter IV in the section for Oilville, Logan County, where, according to Hennen, its blossom shows in the 10 feet of partly concealed measures just below the Lower Freeport Sandstone. Its thickness there was not determined.

In the section for Naugatuck in the same Chapter, the coal is noted just below the Lower Freeport Sandstone. Here, according to Reger, it outcrops in a saddle along a high ridge where the blossom is heavy. Dr. M. H. Waldron, who once prospected the hill for coal, reports that a hole was dug 4 feet deep and a boring sunk 15 feet further into the coal, making a total thickness of 19 feet, without reaching the bottom. It is possible that several hill tops along the Coalburg Syncline contain this coal in minable quantities. Its crop is not shown on Map II but its horizon belongs 50 to 75 feet above the No. 5 Block which is shown on this map.

The East Lynn Sandstone.

The East Lynn Sandstone of Krebs[1], named from East Lynn, Wayne County, is the highest important stratigraphic horizon that is present over an extensive area of Logan and Mingo. The sandstone as it appears in these two counties is coarse, massive, gray, often carrying large quartz pebbles, and varying in thickness from 40 to 150 feet, but usually being only about 50 feet. It is possible that where the maximum thickness is attained it represents a consolidation with the Lower Freeport Sandstone above. It is probable that the East Lynn Sandstone correlates with the lower division of the Lower Freeport Sandstone of western Pennsylvania and northern West Virginia, though it has never been traced across the state.

Its outcrop may be determined closely from Map II by the No. 5 Block Coal, which underlies it by only a few feet, the outcrop of which is shown.

Its occurrence is noted in the sections for Breeden, Chattaroy, Clothier, Coon Knob, Dingess, Ethel, Hale, Logan-Lincoln-Mingo Corner, Manbar, Naugatuck, Rawl, and Sprigg, published in Chapter IV.

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[1] **C. E. Krebs, Cabell-Wayne-Lincoln Report, W. Va. G. S., p. 183; 1913.**

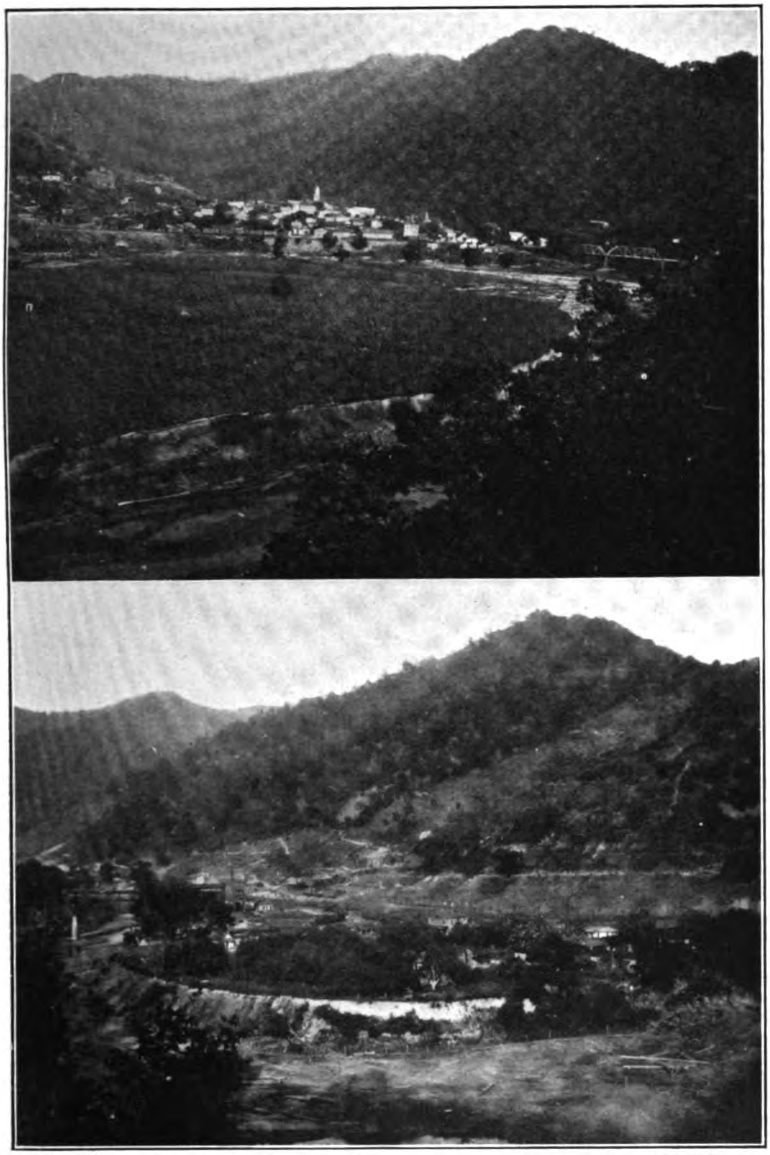

PLATE III.—View of Logan and topography of the Kanawha Series (above), (see page 8) and view showing plant of Aracoma Coal Co. at Logan and topography of the Kanawha Series (below).

In Logan County the East Lynn Sandstone occurs in a narrow strip of territory about two miles wide along the northwest edge, next to Lincoln County. At the corner of Logan, Mingo and Lincoln, it is a prominent feature, full of pebbles, lying between the Upper Kittanning and No. 5 Block Coals. Passing southeastward across the Warfield Anticline, it belongs above the hill tops for several miles. In the Coalburg Syncline, it is generally present in the high hills on both sides of the axis between the 800-foot structure contour on the northwest and the 1200-foot contour on the southeast, as shown by the sections in Chapter IV. It is also present along Buffalo Creek to the east end of Logan County and at the corner of Logan, Boone and Wyoming it caps the hill top.

In Mingo County, the East Lynn Sandstone is generally present in Harvey, Warfield, Hardee, Lee, Williamson, and Magnolia Districts, being usually found high in the hills, and carrying many large quartz pebbles.

The East Lynn Sandstone, so far as observed, is not quarried in the two counties. It is not so well suited for building stone as the sandstones of the Kanawha Series below it.

The Middle Kittanning Coal.

The Middle Kittanning Coal belongs just below the East Lynn Sandstone and only a few feet above the No. 5 Block Coal. Its crop should follow closely that shown for the No. 5 Block on Map II. The only place where it was observed in the two counties is along Island Creek, Logan County, where a heavy blossom of it was noted by Hennen in the section for Oilville, published in Chapter IV, at an elevation of 2015 feet above sea level, and 22 feet above the No. 5 Block Coal. It is not probable that the Middle Kittanning is of minable thickness in the two counties.

The No. 5 Block Coal.

The No. 5 Block Coal, which is thought to be the same as the Lower Kittanning of northern West Virginia, western Pennsylvania, and western Maryland, and which lies only a short distance under the East Lynn Sandstone, is the only coal that is generally present in the Allegheny Series in Logan and Mingo.

In the Kanawha Valley, the coal has long been mined and known as the No. 5 Block, and that name will be used for it in the present volume.

For a description of the No. 5 Block Coal and its connection with the Lower Kittanning, by Dr. I. C. White, reference is made to pages 494-577 of Volume II(a) of the State Survey Reports.

The No. 5 Block Coal in Logan and Mingo is multiple bedded, usually having several partings of dark slate or gray shale. Some of the layers of coal are soft and others are hard and splinty, a streak of soft gas coal being nearly always present at the top of the seam. The nature and number of the partings, as well as the character of the coal between them, are so variable that it is usually not possible to recognize the coal in different places by its section alone. It varies in thickness from 5 to 10 feet. The following section represents it fairly well:

			Feet.	Inches.
Coal, soft, gas	1'	0"		
Slate, dark	0	2		
Coal, hard, splinty	1	6		
Slate, dark, soft	0	6		
Coal, hard, splint	0	8		
Shale, gray	0	2		
Coal, splint	2	0	6	0

The coal usually directly underlies the great pebbly East Lynn Sandstone, the Middle Kittanning and the shales between the two coals not often being present. The sandstone is a valuable stratigraphic horizon for tracing the coal.

The outcrop of the No. 5 Block Coal is shown on Map II. In **Logan** County, it is present along the Logan and Lincoln County Line and in the Coalburg Syncline. In **Mingo**, it is present in Harvey, Warfield, Hardee, Lee, Williamson, and Magnolia Districts, being always well up in the hills.

In Chapter IV the presence of the coal is noted in the sections of the Logan-Lincoln-Mingo Corner, Clothier, Ethel, Oilville, Manbar, Breeden, Hale, Naugatuck, and Myrtle.

Numerous sections of the coal, measured at various points in the two counties, will be given in Chapter VIII.

The Clarion Coal.

The Clarion Coal, which belongs a short distance under the No. 5 Block, is not usually found in the two counties.

Along the Coalburg Syncline in the vicinity of Ethel, Logan County, there is a considerable body of sediments between the No. 5 Block Coal above and the Homewood Sandstone of the Kanawha Series below. In the section for Ethel, published in Chapter IV, the Clarion Coal is represented by 3 feet of splint coal, coming 20 feet below the No. 5 Block. This coal may be only a split off the No. 5 Block. In the section for Oilville, the Clarion Coal is 1′ 6″ thick, being 32 feet under the No. 5 Block. It is not of sufficient prevalence to be classed as a minable coal.

The Lower Clarion Sandtone.

Along the Coalburg Syncline in Logan County, a massive sandstone 60 to 75 feet thick appears between the No. 5 Block Coal and the Homewood Sandstone. In the section for Clothier in Chapter IV, it is buff colored, medium coarse, and comes just below the 15-foot interval that should contain the No. 5 Block. In the section for Ethel, a massive sandstone 75 feet thick is reported just below the Clarion Coal. If the coal above it is correctly correlated as the Clarion, then this sandstone should be the Lower Clarion. If the coal should prove to be merely a split off the No. 5 Block, then this sandstone should be called the Clarion.

The Lower Clarion Coal.

In the section for Ethel, Logan County, in Chapter IV, a coal, 1′ 4″ thick, is noted 10 feet above the Homewood Sandstone, and 103 feet below the No. 5 Block Coal, which is called the Lower Clarion. This classification is subject to revision for the same reasons as mentioned for the Clarion Coal and Lower Clarion Sandstone above. It was not observed at any other point in the two counties.

CHAPTER VI.

STRATIGRAPHY—THE KANAWHA SERIES

GENERAL ACCOUNT AND SECTION.

The Kanawha Series or Upper Pottsville Rocks begins at top with the Homewood or Roaring Creek Sandstone and extends down through the rock column to the top of the great Nuttall Sandstone of the Kanawha Valley, and as thus limited has a maximum thickness of about 1200 feet in the latter region as against 1800 to 1900 feet on Tug Fork in southeastern Mingo County, representing an expansion to the southwest of 600 to 700 feet.

The series was first named by I. C. White from its development in the Kanawha River region of the State, as given on pages 500-502 of Vol. II of the W. Va. Geological Survey Reports and further described by him on pages 267-268 of Vol. II(a) of the same reports. In the area under discussion, the strata composing the same vary little from the type locality, only with an increased number of members due to the expansion, and, as in the latter region, these consist of massive sandstones, coal beds, impure fire clays, sandy and argillaceous shales, buff and black in color, and several thin, impure, lenticular and marine fossiliferous limestones. Probably 90 per cent. of the surface rocks of Logan and Mingo are represented by the Kanawha Series, the detailed crop of which is outlined with appropriate symbol on Map II. Sandstones predominate, probably constituting 60 per cent. of the strata, but the contained coals have by far the greatest economic value, the series holding in these counties in the different regions altogether

15 to 20 minable beds, the descriptions of which are given on subsequent pages of this Chapter and Chapter VIII.

Since the bulk of the surface rocks of the Logan-Mingo area belong to the Kanawha Series, the effect of the strata composing the latter on the topography of the two counties is described in detail on preceding pages in Chapter II.

In harmony with the results of the investigations in the field during 1913, the details of which are given at the beginning of Chapter IV, page 43, the following generalized section of the measures has been compiled by Hennen for Logan and Mingo Counties:

General Section, Kanawha Series.

		Thickness Feet.	Total Feet.	
1.	**Sandstone, Homewood**	75 to 100	100	
2.	Shale (horizon of Kanawha Black Flint)	0 to 10	110	
3.	**Coal, Stockton, multiple bedded, splinty layers**	0 to 10	120	120′
4.	Shale, sandy, with impure fire clays	25 to 50	170	
5.	**Sandstone, Upper Coalburg, coarse, massive, gray, often weathering into "chimney rock" columns on the summits**	50 to 80	250	
6.	Shale	5 to 10	260	
7.	**Coal, Coalburg, multiple bedded, splinty layers**	2 to 10	270	150′
8.	Fire clay, impure, and sandy shale	0 to 20	290	
9.	**Coal, Little Coalburg, double-bedded, split from Coalburg**	0 to 3	293	
10.	Fire clay, impure, sandy shales, with thin coals	22	315	
11.	**Sandstone, Lower Coalburg, forms great cliffs**	20 to 40	355	
12.	Shale, sandy	5 to 9	364	
13.	**Coal, Buffalo Creek, multiple bedded, hard, splinty**	0 to 6	370	100′
14.	Fire clay and shale	35 to 55	425	
15.	**Limestone, Buffalo Creek, Winifrede? gray and hard, lenticular, with marine fossils**	0 to 2	427	
16.	**Sandstone, Upper Winifrede, massive, yellowish gray**	20 to 30	457	
17.	Shale	2 to 3	460	
18.	**Coal, Winifrede, multiple bedded, hard, splinty**	1 to 10	470	100′

		Thickness Feet.	Total Feet.	
19.	Fire clay, impure, and sandy shales	2 to 5	475	
20.	Sandstone, Lower Winifrede, massive	20 to 40	515	
21.	Shale	1 to 2	517	
22.	Coal, Chilton "A," multiple bedded	0 to 3	520	50′
23.	Fire clay, impure, and shale	10 to 18	538	
24.	Sandstone, Upper Chilton, medium-grained, massive, micaceous	20 to 40	578	
25.	Coal, Chilton "Rider," splinty, multiple bedded	0 to 4	582	
26.	Fire clay and gray shale	0 to 20	602	
27.	Coal, Chilton, multiple bedded, splinty and same as mined on Dingess Run and Spruce Fork, Logan County	1 to 8	610	90′
28.	Fire clay, impure and shale	0 to 5	615	
29.	Sandstone, Lower Chilton, massive	0 to 30	645	
30.	Coal, Little Chilton, double bedded	0 to 2	647	
31.	Sandstone, Hernshaw	20 to 49	696	
32.	Coal, Hernshaw, multiple bedded, "Black Band" of Lens Creek, Kanawha County	0 to 4	700	90′
33.	Fire clay and sandy shales	1 to 5	705	
34.	Sandstone, Naugatuck	15 to 21	726	
35.	Coal, Dingess, multiple bedded, gas coal, once mined at Dingess	1 to 4	730	30′
36.	Shale	1 to 5	735	
37.	Sandstone, Williamson	5 to 20	755	
38.	Shale	1 to 5	760	
39.	Limestone, Dingess, gray and hard, frequently brown and silicious, lenticular, and ferriferous, with marine fossils	0 to 2	762	
40.	Shale, dark green, sandy, with iron ore nodules and plant fossils	0 to 30	792	
41.	Coal, Williamson, multiple bedded, splinty	1 to 8	800	70′
42.	Fire clay, impure, and shale	1 to 5	805	
43.	Sandstone, Upper Cedar Grove	10 to 40	845	
44.	Shale, dark gray, with iron ore nodules and plant fossils	20 to 50	895	
45.	Coal, Cedar Grove, splinty at bottom, upper bench of Cedar Grove proper and "Island Creek" bed; also same at "Red Jacket" or "Upper Thacker"	2 to 5	900	100′
46.	Fire clay and shale	0 to 10	910	
47.	Sandstone, Middle Cedar Grove, sometimes holding a thin coal	0 to 60	970	

		Thickness Feet.	Total Feet.	
48.	Coal, Lower Cedar Grove, multiple bedded, splinty at top and is lower bench of the Cedar Grove proper, and "Island Creek" bed; also same as "Lower Thacker"............	2 to 5	975	75′
49.	Fire clay, impure, and shale.....	1 to 10	985	
50.	Sandstone, Lower Cedar Grove...	20 to 30	1015	
50A.	Coal, Alma "A"................	0 to 1	1016	
51.	Shale, dark gray, with iron ore nodules and plant fossils.....	5 to 9	1025	
52.	Coal, Alma, multiple bedded, splinty layers, same as "Draper" bed of Logan and same as mined at Big Creek, Logan County	2 to 5	1030	55′
53.	Fire clay, impure, and shale.....	0 to 5	1035	
54.	Sandstone, Logan, massive, bluish gray, medium grained.....	20 to 40	1075	
55.	Shale, sandy..................	1 to 5	1080	
56.	Coal, Little Alma, multiple bedded, slaty..................	0 to 3	1083	53′
57.	Sandstone, massive, Peerless....	15 to 29	1112	
58.	Shale, sandy, gray, and flaggy..	1 to 5	1117	
59.	Limestone, Campbell Creek, dark gray, hard, silicious, lenticular; no marine fossils observed in area, but horizon carrying marine forms at Bald Knob, Boone County	0 to 2	1119	
60.	Shale, flaggy and sandy, with iron ore nodules and plant fossils	10 to 20	1139	
61.	Coal, Campbell Creek, multiple bedded, gas type and "Upper War Eagle" on Turkey Creek; also same as "No. 2 Gas" of Kanawha Valley and "Rawl" and "Warfield" of Tug Fork...	2 to 6	1145	62′
62.	Sandstone, Brownstown.........	25 to 51	1196	
63.	Coal, Powellton "A," double bedded	0 to 1	1197	
64.	Shale, sandy, flaggy and laminated	10 to 20	1217	
65.	Coal, Powellton, double bedded, same as "Hatfield Tunnel" vein	0 to 3	1220	75′
66.	Shale, dark, laminated..........	10 to 20	1240	
66A.	Limestone, Stockton, silicious, lenticular	0 to 4	1244	
67.	Sandstone, shale, dark, and sandstone	25 to 34	1278	
68.	Coal, Matewan, double bedded..	0 to 2	1280	60′
69.	Sandstone, Matewan............	20 to 40	1320	
70.	Coal, Eagle "A," gas coal.......	0 to 2	1322	42′

		Thickness Feet.	Total Feet.	
71.	**Sandstone, Eagle**...............	20 to 37	1359	
72.	**Shale**	5 to 10	1369	
73.	**Coal, Eagle, gas coal, and same as "Middle War Eagle"** of Turkey Creek....................	1 to 6	1375	53′
74.	Fire clay, impure, and shale...	0 to 5	1380	
75.	**Sandstone, Bens Creek**..........	0 to 27	1407	
76.	**Coal, Bens Creek**, gas, soft, columnar, multiple bedded and probably a split off main Eagle	0 to 3	1410	35′
77.	Fire clay and shale.............	5 to 10	1420	
78.	**Sandstone, Decota**, massive.....	40 to 57	1477	
79.	**Shale**	5 to 10	1487	
80.	**Coal, Little Eagle, double bedded,** gas coal......................	1 to 3	1490	80′
81.	**Sandstone**, flaggy and shaly....	0 to 20	1510	
82.	**Coal, Cedar, multiple bedded, gas** coal, same as once mined at Cedar, Mingo County, and probably a split off Little Eagle..	0 to 4	1514	24′
83.	**Sandstone, Grapevine**...........	25 to 30	1544	
84.	Slate, black, laminated, with **marine fossils, Eagle**.........	15 to 20	1564	
85.	**Limestone, Eagle**, dark, brittle, hard, lenticular, **marine fossils**	0 to 2	1566	52′
86.	Slate, black, iron ore nodules, **marine fossils, Eagle**.........	10 to 25	1591	
87.	**Coal, Little Cedar, gas coal**......	0 to 1	1592	26′
88.	**Sandstone, Lower War Eagle** ..	20 to 30	1622	
89.	**Shale**	5 to 10	1632	
90.	**Coal, Lower War Eagle, gas, soft,** multiple bedded..............	0 to 3	1635	43′
91.	**Shale**	1 to 5	1640	
92.	**Sandstone, Upper Gilbert, gray**ish white, massive, medium grained	40 to 50	1690	
93.	Shale, black, with iron ore nodules	15 to 15	1705	
94.	**Sandstone**, bluish-gray laminated	15 to 15	1720	
95.	**Coal, Glenalum Tunnel, multiple** bedded, much split up with slate partings 1 to 2 feet thick, soft gas type................	0 to 15	1785	100′
96.	**Sandstone, Lower Gilbert**, massive, grayish white...........	50 to 80	1815	
97.	**Shale**	1 to 4	1819	
98.	**Coal, Gilbert**, double bedded, gas	0 to 1	1820	85′
99.	**Shale**, sandy...................	5 to 10	1830	
LOWER POTTSVILLE.				
100.	**Sandstone, Wharncliffe-Dotson,** grayish white, current bedded, medium grained, to Tug River at War Eagle................	130	1960	

In the above section the minimum thicknesses of formations represent determinations along the northwestern border of the two counties; while the maximum correspond to results obtained in the southeastern portions of the same areas; and the "total" column, the sum of the latter figures.

The great thinning of the series within Logan and Mingo takes place more rapidly in the western portions of these areas than in the eastern, especially is this true northwestward from a straight line through Chapmanville and Naugatuck.

LOCAL SECTIONS.

Several sections actually measured at different exposures throughout the two counties will now be given, roughly northwest to southeast, by magisterial districts. Wherever possible these were obtained on the strike of the strata so as to get the true vertical intervals.

Chapmanville District, Logan County.

The following section was measured by Hennen with aneroid in the extreme northern point of Chapmanville District, Logan County, from the low gap between Trace Branch of Ugly and Chapman Branch of Big Creek, southwestward along the public road:

Chapman Branch Section.

	Thickness Feet.	Total Feet.
Concealed from low gap	87	87
Concealed along bench	5	92
Concealed in bluff	30	122
Concealed along bench	5	127
Concealed in bench	25	152
Sandstone, massive, Hernshaw	3	155
Concealed	7	162
Coal blossom, Hernshaw	0	162
Sandstone, coarse, massive, medium-grained, micaceous, Naugatuck	45	207
Concealed	15	222
Shale	5	227
Sandstone, massive, yellowish gray, micaceous, Williamson	25	252

		Thickness Feet.	Total Feet.	
Concealed, coal blossom and shale..........4' 6" Coal 0 6	**Williamson Coal**	5	257	
Sandstone and shale.......................		5	262	
Concealed (holding Cedar Grove and Lower Cedar Grove Coals)....................		63	325	
Shale		3	328	
Coal, gas, hard.........0' 9" Slate, black............0 1 Coal, splint............2 0	**Alma** (2' 10")	3	331	331'
Concealed		6	337	
Sandstone, massive........................		10	347	
Coall, slaty, 0' to 10", **Little Alma**...........		1	348	
Concealed and shale.......................		48	396	
Limestone, silicious, Campbell Creek.......		1	397	
Shale, black, and concealed................		26	423	
Shale, dark gray, iron ore nodules, and plant fossils in profusion....................		4	427	
Coal ....0' 1" Shale, gray............0 6 Coal, gas...............0 6 Coal and slate, black, mixed ....0 7 Coal, gas, hard.........0 5 Coal, splint............1 9	**Campbell Creek** .... **(No. 2 Gas)** (3' 10") 760' B.	4	431	100'
Fire clay, sandstone flaggy, and shale flaggy		120	551	
Shale, black		38	589	
Limestone, silicious, in bed of Big Creek...		2	591	

The following section was measured with aneroid by Reger down the point immediately northwest of Stone Branch Station:

Stone Branch Section.

	Thickness Feet.	Total Feet.	
Sandstone, massive, Williamson............	40	40	
Coal streak, Williamson....................	0	40	
Concealed	5	45	
Sandstone, shaly...........................	5	50	
Iron ore fragments.........................	0	50	
Shale, dark, fragments, and concealed......	25	75	
Sandstone, massive........................	30	105	
Concealed	30	135	
Coal prospect, Alma, (767' L.)..............	...	135	95'
Sandstone, massive, Logan................	40	175	
Slate, gray................................	2	177	
Concealed	8	185	
Sandstone, massive, Peerless...............	30	215	
Shale, gray	10	225	
Concealed	5	230	
Coal prospect, closed. **Campbell Creek (No. 2 Gas)** (672' B.)..........................	...	230	95'
Concealed to railroad grade................	45	275	
Concealed to Guyandot River...............	35	310	

Passing up the east side of Guyandot River about 3 miles, the following section was obtained by Hennen with aneroid, one-third mile south of Chapmanville Station:

Chapmanville Special Section.

	Thickness Feet.	Total Feet.
Slate, silicious		
Coal, Alma, 3′ 9″ (995′ B.)	4	4
Fire clay, concealed and sandstone, massive, friable, fine	95	99
Concealed along flat bench	6	105
Sandstone, massive, forms steep bluff	60	165
Concealed along bench	10	175
Sandstone and concealed along steep bluff	70	245
Concealed along bench	5	250
Concealed to railroad grade and top of Andy Fowler well No. 1 (No. 18 on Map II), (650′ B.)	100	350

Passing to the western portion of Chapmanville District, the following section was measured by Reger with aneroid down the east hillside of Hart Creek, 1¾ miles north of Whirlwind:

Whirlwind Section.

	Thickness Feet.	Total Feet.	
Sandstone, massive, capping knob	20	20	
Concealed	110	130	
Sandstone, massive	30	160	
Concealed	20	180	
Sandstone, massive	140	320	
Concealed	40	360	
Sandstone, massive	10	370	
Concealed	100	470	
Sandstone	70	540	
Concealed	35	575	
Sandstone	65	640	
Concealed in bench	5	645	
Sandstone	55	700	
Coal prospect, thickness concealed, Alma, (735′ B.)	...	700	700′
Concealed	5	705	
Sandstone, concealed, and sandstone, to Hart Creek	55	760	

Logan District, Logan County.

Just north of the extreme northern edge of Logan District, in the edge of Boone County, the following hand-leveled section was measured by Hennen on the west hillside of Little Coal River at Ramage. The section is given space in this report on account of its importance in the correlation of the coal mined here with the Alma, which is absolutely the same thick bed that passes below railroad grade about one-half mile below Clothier:

Ramage Section.

				Thickness Ft.	In.	Total Ft.	In.	
Shale, sandy				2	0	2	0	
Sandstone, with iron ore nodules and marine fossils	1'	0"	Dingess Limestone horizon	4	0	6	0	
Shale, sandy	1	6						
Sandstone, ferriferous, marine fossils in profusion	1	6						
Coal, gas	0'	2 "	Williamson	8	0	14	0	14' 0"
Shale, gray 0' 0¼" to	0	0½						
Coal, gas	1	5						
Slate, dark gray 0' 1" to	0	2						
Coal, gas, soft	0	10						
Fire clay shale	3	4						
Coal, semi-splint	0	6½						
Bone, 0' 0½" to	0	1						
Coal, semi-splint	1	5						
Slate				1	0	15	0	
Sandstone, massive				5	0	20	0	
Concealed				20	0	40	0	
Shale, dark				7	0	47	0	
Coal, gas	0'	8"	Cedar Grove	3	8	50	8	36' 8"
Coal, splint	0	10						
Shale, dark gray	0	1						
Coal, splint	1	4						
Shale, gray	0	5						
Coal, splinty	0	4						
Fire clay and concealed				29	0	79	8	
Coal, splint	0'	4"	Lower Cedar Grove	1	6	81	2	30' 6"
Coal, gas, hard	1	2						
Fire clay				2	0	83	2	
Shale, greenish-gray				26	6	109	8	
Coal, semi-splint	1'	0 "	Alma (935' B.)	4	5	114	1	32' 11"
Slate, bony	0	2						
Coal, gas	0	5½						
Coal, splint, hard	0	5½						
Coal, gas	0	2						
Coal, splint	2	2						
Slate, gray								

The following section was measured with aneroid by R. M. Gawthrop from the summit of a high knob northward to the bed of Beech Creek 100 to 200 feet below the mouth of Left Fork and slightly over a mile southwest of Sharples. It is important in that the relative positions of the Coalburg, Buffalo Creek and Winifrede Coals harmonize with that given for the Clothier Section in Chapter IV:

Beech Creek Section.

1 Mile S. W. of Sharples at mouth of Left Fork of Beech Creek.

			Thickness Feet.	Total Feet.	
Allegheny Series (90')					
Concealed from top of knob			25	25	
Sandstone, gray, flaggy			20	45	
Concealed			45	90	
Kanawha Series (600')					
Sandstone, massive			20	110	
Concealed to bench			85	195	
Concealed, with sandstone			30	225	
Concealed to bench			40	265	
Concealed			84	349	
Shale, sandy			5	354	
Coal, slaty	0' 5"	Coalburg (6' 3") (1210' B.)	6	360	360'
Slate	0 1				
Coal, slaty	1 8				
Coal, gas	0 10				
Coal, harder	0 3				
Shale, coaly	2 0				
Coal, hard	1 0				
Concealed			54	414	
Shale, gray			3	417	
Coal, slaty	0' 6"	Buffalo Creek (3' 2") (1150' B.)	3	420	60'
Coal, soft	0 10				
Bone	0 3				
Coal, hard	1 7				
Concealed			130	550	
Coal, visible, 0' 6", Winifrede (1020' B.)			...	550	130'
Concealed, with sandstone			125	675	
Sandstone, massive, gray			5	680	
Shale, gray			5	685	
Coal, visible, Chilton (883' B.)			2	687	137'
Concealed to run bed			3	690	

Passing westward 8 miles in Logan District, the following section was measured with aneroid by Reger down the north hillside of Crooked Creek, connecting the openings at the E. R. Johnson Coal Co. mines in the Chilton and Alma Coal beds. It is of special interest in that the Eagle Shales are apparently represented in the basal formation, although no marine fossils are reported:

Hughey Section.

			Thickness Feet.	Total Feet.	
Sandstone, massive			20	20	
Coal, soft	0' 7"	Chilton (5' 6")	5	25	25'
Coal, semi-splint	1 3				
Bone	0 5				
Coal, semi-splint	2 0				
Shale, gray	0 11				
Coal	0 4				
Fire clay and concealed			10	35	
Sandstone, broken, Lower Chilton			50	85	
Concealed			10	95	
Sandstone			80	175	
Concealed			20	195	
Sandstone			30	225	
Concealed			10	235	
Sandstone			35	270	
Concealed			25	295	
Shale, brown, silicious			16	311	
Coal, medium hard	0' 10"	(4' 0") Alma (1060' B.)	4	315	290'
Coal, semi-splint	2 8				
Coal, splint	0 6				
Fire clay and concealed			10	325	
Sandstone, Logan			70	395	
Concealed			10	405	
Sandstone			20	425	
Concealed			30	455	
Coal digging, no coal visible, Campbell Creek, (No. 2 Gas) (920' B)			...	455	140'
Concealed			40	495	
Sandstone			35	530	
Concealed and shale			15	545	
Coal, Matewan? (830' B.)			0	545	90'
Shale and concealed			25	570	
Sandstone, Eagle			50	620	
Shale. sandy			60	680	
Sandstone, massive, Decota			20	700	
Concealed			7	707	
Sandstone, broken			8	715	
Coal, Little Eagle (2' 0") (660' B.)			0	715	170'
Shale, silicious, with plant fossils			6	721	
Sandstone, massive, Grapevine, (Peach Creek Station quarry rock)			15	736	
Shale, dark, with streaks of iron, Eagle			8	744	
Sandstone, limy, **Eagle Limestone**, 0' to			2	746	
Shale, dark, to C. & O. R. R. grade			8	754	

The following hand-leveled section was made by Reger in the same region, about 200 feet south of the mouth of Peach Creek:

Peach Creek Section.

	Thickness Feet.	Total Feet.	
Coal blossom, Alma, (997′ L.)	...	0	
Sandstone, massive, Logan	64	64	
Concealed	46	110	
Coal, digging, thickness concealed, Campbell Creek (No. 2 Gas) (887′ L.)	...	110	110′
Concealed, with sandstone	26	136	
Sandstone, Brownstown	22	158	
Concealed	40	198	
Sandstone, shaly	18	216	
Concealed	27	243	
Sandstone	8	251	
Concealed	39	290	
Sandstone, shaly, Eagle	21	311	
Shale, green, with plant fossils	11	322	
Coal, semi-splint, Eagle (0′ 11″), (674′ L.)	1	323	213′
Fire clay and concealed to railroad grade	6	329	

Passing 7 to 8 miles westward, the following aneroid section was obtained by Reger near the Logan-Mingo County Line along the hill road on the head of Mud Fork leading over to Dingess, 3 miles east of the latter place:

Mud Fork Section.

	Thickness Feet.	Total Feet.	
Sandstone, coarse, massive, brown, capping knob	15	15	
Concealed	30	45	
Sandstone, massive, coarse, with small quartz pebbles, Upper Coalburg	20	65	
Concealed, mostly shale	45	110	
Sandstone, massive, coarse, Lower Coalburg	40	150	
Concealed to gap	5	155	
Shale, silicious	25	180	
Sandstone, massive, soft, Upper Winifrede	20	200	
Concealed	5	205	
Coal blossom, Winifrede (0′ 4″), 1545′ B.	0	205	205′
Sandstone, massive, coarse, soft, light brown, with Sigillariae fossils, Lower Winifrede	105	310	
Concealed, with shale	20	330	
Sandstone	10	340	
Coal (thickness concealed), Chilton "A"	0	340	135′
Concealed	15	355	
Sandstone, Upper Chilton	20	375	
Concealed, with coal blossom, Chilton, (1370′ B.)	5	380	40′
Sandstone, flaggy	15	395	
Concealed	15	410	

	Thickness Feet.	Total Feet.	
Sandstone	10	420	
Shale, sandy..............................	15	435	
Concealed	5	440	
Coal, Little Chilton (0' 3"), (1310' B.).......	0	440	60'
Concealed	65	505	
Sandstone	10	515	
Concealed with coal blossom not in place....	45	560	
Sandstone	25	585	
Concealed	39	624	
Coal blossom, Cedar Grove (1' 3" visible) (1125' B.)...........................	1	625	185'
Concealed	25	650	
Shale, gray...............................	10	660	
Concealed and sandstone, shaly, Logan.....	112	772	
Shale, brown..............................	6	778	
Coal, Campbell Creek (No. 2 Gas) (2' 3½"), (970' B.)..............................	2	780	155'

Passing 5 miles southeastward in the same district, the following section was measured with hand-level by Reger from the summit of a high knob northwestward to Copperas Mine Fork at Holden. It is of special interest in that accurate measurements are given between definitely correlated formations; viz, Coalburg, Williamson and Cedar Grove ("Island Creek") Coals and the marine fossiliferous Dingess Limestone:

Holden Section.

				Thickness Feet.	Total Feet.	
Sandstone, massive, capping knob, Homewood				40	40	
Concealed in bench........................				20	60	
Sandstone, massive, Upper Coalburg, upper portion				33	93	
Concealed				59.5	152.5	
Coal, gas...........	0'	10"	(12' 6"). **Coalburg** .... (1430' L.) (Supplied from Vol. II(a) p. 475.)	12.5	165	165'
Cannel, bony.......	3	0				
Shale, gray.........	0	2				
Coal, soft at top....	2	3				
Shale, bluish-gray...	0	1				
Coal, bony..........	0	11				
Shale, dark.........	0	11				
Coal, gas...........	0	10				
Fire clay...........	1	0				
Coal, flint..........	2	6				
Concealed				5	170	
Sandstone, massive, with small pebbles, Lower Coalburg.........................				50	220	
Concealed in bench........................				22	242	
Sandstone, massive, gray, medium coarse,						

	Thickness Feet.	Total Feet.	
micaceous, making prominent cliff, Upper Winifrede	84	326	
Concealed along slope	48	374	
Concealed, mostly sandstone	70	444	
Concealed in bench	5	449	
Concealed in bluff	86	535	
Concealed in bench	10	545	
Concealed in bluff	105	650	
Concealed in bench	5	655	
Concealed	41	696	
Sandstone, massive, gray, exposed at water tank	20	716	
Concealed	43	759	
Sandy shales	5	764	
Sandstone, ferriferous, with marine fossils, Dingess Limestone	0.5	764.5	599.5′
Sandstone, hard	1.0	765.5	
Shale, sandy	15	780.5	
Sandstone, shaly	2	782.5	
Coal 0′ 11″ Shale, gray 0 11 Sandstone, lenticular, 0′ to 2 0 Coal 1 10 (5′ 10″) **Williamson**	6	788.5	24′
Fire clay	1.5	790	
Sandstone, massive, gray, micaceous, quarry rock, Upper Cedar Grove	46	836	
Shale, dark, gray, fine, laminated, sandy	27	863	
Coal, semi-splint 0′ 9″ Coal, splint 1 6 Shale, gray, hard 0 1½ Coal, semi-splint 0 11 Coal, splint 1 0 Coal, semi-splint 2 7 (6′ 10½″) **Cedar Grove** **"Island Creek"** (726′ L.)	7	870	81.5
Concealed to creek	11	881	

One mile and a half eastward the following section was measured with aneroid by Reger from the summit of a high knob down the west hillside of Whitman Creek to the bed of the latter stream at the northwest edge of the town of Whitman. It apparently reaches up almost to the base of the Allegheny Series, and exhibits the Cedar Grove and Lower Cedar Grove Coals combined into the locally known "Island Creek" bed, or the true Cedar Grove of the Kanawha Valley:

Whitman Section.

	Thickness Feet.	Total Feet
Sandstone, massive, Homewood, capping knob	60	60
Concealed in bench	25	85

	Thickness Feet.	Total Feet.	
Sandstone, massive	40	125	
Concealed in bench	10	135	
Sandstone, massive, with quartz pebbles, making series of cliffs, Upper and Lower Coalburg	145	280	
Concealed	25	305	
Sandstone, massive, Upper Winifrede	60	365	
Concealed	40	405	
Sandstone, partly concealed, making steep bluff	115	520	
Concealed in bench	5	525	
Concealed in bluff	30	555	
Coal blossom, Chilton "A," (thickness concealed)	...	555	
Concealed in bluff	100	655	
Coal Chilton, (thickness concealed) (972′ B.)	...	655	655′
Concealed	60	715	
Sandstone, massive, Hernshaw	10	725	
Concealed	10	735	
Shale, sandy	30	765	
Concealed	10	775	
Sandstone, shaly, Williamson	35	810	
Coal, Williamson, (0′ 6″), (817′ B.)	0.5	810.5	155′
Fire clay	0.5	811	
Shale, sandy	29	840	
Sandstone. Upper Cedar Grove	44	884	
Coal, Cedar Grove "Rider" (6″)	0.5	884.5	
Shale, sandy	5.5	890	
Coal, soft 0′ 11″ Coal, semi-splint 1 6 Slate, dark 0 3 Coal, hard 4 0 (6′ 8″) **Cedar Grove ("Island Creek")** (730′ L.)	7	897	87′
Sandstone, shaly, Lower Cedar Grove	12	909	
Shale	0.5	909.5	
Coal Alma "A" (0′ 6″)	0.5	910	
Fire clay	2	912	
Shale, sandy	16	928	
Coal 1′ 8″ Shale, gray 0 4 Coal 2 6 (4′ 6″) **Alma, (695′ B.)**	4.5	932.5	35′
Fire clay shale	1.5	934	
Sandstone, massive. Logan, to Whitman Creek	20.0	954	

The true position of the coal locally known as the "Island Creek" is exhibited in the following section measured by Reger with hand-level on main Island Creek, 3 miles southeastward, the two basal members being supplied from exposures at a prospect hole sunk 1 mile westward:

Zinn Branch Section.

			Thickness Feet.	Total Feet.	
Shale, sandy					
Sandstone, brown, ferriferous, containing marine fossils, Dingess Limestone horizon (0′ 6″), (814′ B.)			0	0	
Shale and concealed			27	27	
Coal	0′ 5″	(4′ 5″) Williamson (783′ B.)	4.5	31.5	31′
Shale	0 5				
Coal	0 6				
Shale	0 8				
Coal	0 11½				
Shale, black	0 0½				
Coal	1 5				
Shale and concealed			5.5	37	
Sandstone, massive, Upper Cedar Grove			45	82	
Shale, sandy			12	94	
Coal, Cedar Grove "Rider" (1′ 6″), (719′ B.)			1.5	95.5	
Fire clay to bed of Island Creek, and shale			9	104.5	
Coal, Cedar Grove, "Island Creek"			7	111.5	80′

The following details of the Kanawha Series, including an unrecorded interval of about 100 feet in the Allegheny, are obtained by combining an aneroid section measured by Reger from a prospect in the Coalburg Coal, located 0.6 mile eastward from the common corner of Logan, Hardee and Lee Magisterial Districts, northeastward to Laurel Fork of Pine Creek, with the record of the Wood, Cole and Crane Coal Test Boring No. 3 (No. 100 on Map II):

Laurel Fork of Pine Creek Section.

				Thickness		Total	
				Ft.	In.	Ft.	In.
Allegheny Series (100′)							
Interval from top of knob				100	0	100	0
Kanawha Series (973′ 4½″)							
Interval				145	0	245	0
Sandstone, massive, Upper Coalburg, and concealed				118	0	363	0
Coal, soft	1′	0″	(7′ 4″) Coalburg (1380′ B.)	7	4	370	4
Slate, black, with streaks of coal	0	6					
Coal, soft	0	8½					
Slate, gray	0	0½					
Coal, soft	1	6					
Coal, splint	3	7					
Concealed				9	8	380	0
Sandstone, Lower Coalburg				30	0	410	0

	Thickness Ft.	In.	Total Ft.	In.	
Concealed to bore hole	150	0	560	0	
Wood, Cole and Crane No. 3 (100.)					
Surface	21	0	581	0	
Shale	39	0	620	0	
Sand shale	10	0	630	0	
Shale	0	4	630	4	
Slate	0	2	630	6	
Bone coal	0	3	630	9	
Slate	0	4	631	1	
Sand shale	1	0	632	1	
Sandstone	16	0	648	1	
Coal ....0′ 3″ } (4′ 1″)					
Fire clay...1 0 } **Chilton "A"...**	4	1	652	2	281′ 10″
Shale ......2 4 } (1098′ B.)					
Coal ....0 6 }					
Fire clay, sandy	0	6	652	8	
Shale	2	0	654	8	
Sandstone, Upper Chilton	56	0	710	8	
Coal ....0′ 3″ } 9′ 5″ **Chilton,**					
Fire clay...0 5 } **Upper Bench..**	9	5	720	1	67′ 11″
Shale ......7 0 } (1030′ B.)					
Coal ....1 9 }					
Sandy fire clay	1	0	721	1	
Shale	12	0	733	1	
Sandy shale	1	6	734	7	
Shale	0	8	735	3	
Slate	0	2	735	5	
Coal (1014′ B.)	0	4	735	9	15′ 8″
Sandy shale	15	8	751	5	
Shale	2	6	753	11	
Bone coal...0′ 5″ } 1′ 2″ **Chilton,**					
} **Lower Bench.**	1	2	755	1	19′ 4″
Coal ....0 9 } (995′ B.)					
Sandy fire clay	2	0	757	1	
Shale	8	6	765	7	
Sandy shale	3	0	768	7	
Sandstone	11	5	780	0	
Coal, Little Chilton, (969′ B.)	0	6	780	6	25′ 5″
Fire clay	1	0	781	6	
Shale	1	6	783	0	
Sandstone	4	0	787	0	
Shale	2	3	789	3	
Sandstone	5	6	794	9	
Coal	0	7	795	4	14′ 10″
Fire clay	1	6	796	10	
Slate	2	6	799	4	
Sandstone	27	8	827	0	
Bone coal..0′ 2″ } 0′ 7″ **Hernshaw**	0	7	827	7	32′ 3″
Coal ....0 5 } (922′ B.)					
Sandy fire clay	3	2	830	9	
Shale, dark	2	0	832	9	
Sandy shale	3	2	835	11	
Shale	1	3	837	2	
Sandy shale	0	6	837	8	

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Shale	1	8	839	4		
Sandstone	2	3	841	7		
Sandy shale	84	3	925	10		
Dark, sandy slate	11	10	937	8		
Sandstone, dark	0	10	938	6		
Shale	0	8	939	2		
Slate	0	4	939	6		
Coal 1' 0" Bone coal 0 1 Sandstone 0 1½ Bone coal 0 2 Coal 1 3 2' 7½" **Williamson** (808' B.)	2	7½	942	1½	114'	6½"
Fire clay, sandy	1	4	943	5½		
Shale, sandy	5	7	949	0½		
Sandstone, Upper Cedar Grove	39	11½	989	0		
Shale	6	0	995	0		
Coal and bone (775' B.)	0	3	995	3	53'	1½"
Sandy fire clay	1	0	996	3		
Shale, dark	6	0	1002	3		
Shale, sandy	4	0	1006	3		
Slate	10	0	1016	3		
Coal, Cedar Grove "Rider" (733' B.)	1	2	1017	5	22'	2"
Fire clay	2	3	1019	8		
Lime (?) shale	35	6	1055	2		
Dark shale	7	2	1062	4		
Coal 0' 3" Slate 0 0¾ Coal 0 2½ Slate 0 1¼ Coal 3 8 Slate 0 3 Coal 2 5 Fire clay 0 5 Coal 1 8 Fire clay slate 0 4 Coal 0 0¾ (9' 5¼") **Cedar Grove** (678' B.) **"Island Creek"**	9	5¼	1071	9¼	54'	4¼"
Fire clay slate to bottom	1	7¼	1073	4½		

The upper portion of the following section was measured by Hennen from the ridge summit one-half mile due south of the mouth of Righthand Fork of Dingess Run northward down a ravine and connected up with Bore Holes Nos. 72 and 73 on Map II, the basal portion of the section being made up from the logs of these borings. It exhibits the separation of the Cedar Grove—"Island Creek"—bed into two separate and distinct veins by 33 feet 8 inches of sandstone:

Stollings Section.

				Thickness Feet.	Total Feet.	
Allegheny Series (200')						
Concealed from top of ridge				200	200	
Kanawha Series (1005' 7")						
Concealed				124	324	
Slate, black	0'	5 "	(6' 0") **Stockton** .... (1365' B.)	6	330	330'
Coal, slaty	0	2½				
Coal, gas	0	11				
Coal, splint	1	6				
Slate, dark, gray	0	3½				
Coal, gas	1	0				
Bone	0	11				
Coal, gas	0	9				
Fire clay and concealed				20	350	
Sandstone, coarse grained, light gray, massive				15	365	
Concealed				20	385	
Sandstone, massive, medium grained, gray, Upper Coalburg				50	435	
Concealed				30	465	
Sandstone, flaggy, fine grained, micaceous, dove colored, Lower Coalburg				15	480	
Concealed				63.5	543.5	
Coal	0'	1"	(1' 6") **Buffalo Creek**..... (1150' B.)	1.5	545	215'
Shale, gray	0	10				
Coal	0	7				
Fire clay				1	546	
Sandstone, Upper Winifrede, massive, medium grained at base, fine grained at top				52.5	598.5	
Coal, Winifrede (1' 6"), (1095' B.)				1.5	600	55'
Concealed				45	645	
Sandstone, fine grained, dove colored				5	650	
Concealed				10	660	
Shale, dark, sandy				4	664	
Coal (0' 11")				1	665	
Shale				3	668	
Sandstone, flaggy at bottom, laminated top, dove colored, micaceous				22	690	
Slate, coaly	0'	4"	(15' 0") **Chilton "A"**.. (990' B.)	15	705	105'
Coal	0	2				
Coal, slaty	0	1				
Sandstone, flaggy, and sandy shale	11	0				
Coal	0	1				
Sandstone	0	8				
Coal	2	8				
Sandstone, massive, fine grained				5	710	
Shale				13	723	
Coal, Chilton "Rider," (970' B.)				2	725	20'
Sandstone, fine grained, massive, dove colored				24.2	749.2	
Coal	2'	2"	(8' 10") **Chilton** ..... (937' B.)	9	758	33'
Slate, black, flinty	0	3				
Coal	0	5				
Shale	5	0				
Coal	1	0				

	Thickness		Total		
	Feet.		Feet.		
Concealed	5		763		
Sandstone, Lower Chilton, massive, fine grained, micaceous, dove colored	20		783		
Concealed	35		818		
Sandstone, massive, fine grained, micaceous, yellowish-gray	30		848		
Concealed	30		878		
Shale, dark, sandy	20		898		
Sandstone, massive, gray, medium grained	25		923		
Concealed	20		943		
Sandstone, flaggy, Upper Cedar Grove	25		968		
Concealed	17		985		
	Ft.	In.	Ft.	In.	
Coal, Cedar Grove, to top of Coal Test No. 72 on Map II	3	0	988	0	230′ 0″
(Section continued with log of Bore Hole No. 72.)					
Sandstone, Middle Cedar Grove	33	8	1021	8	
Coal, Lower Cedar Grove	2	6	1024	2	36′ 2″
Sand shale, dark	9	5	1033	7	
Slate, gray	0	8	1034	3	
Coal	0	1	1034	4	
Fire clay	0	6	1034	10	
Sand shale	20	2	1055	0	
Sandstone	5	1	1060	1	
Coal and bone....0′ 6″ **Fire clay.........0 10** **Coal ....1 2½** **Fire clay.........0 7½** **Coal ....2 8** **Bone and coal....0 1** **Alma.**	5	11	1066	0	41′ 10″
(Section continued by Coal Test Record No. 73 on Map II.)					
Sand and shale	2	0	1068	0	
Sandstone, Logan	86	7	1154	7	
Coal, Little Alma	0	4	1154	11	88′ 11″
Sandy shale	44	6	1199	5	
Sandstone	0	6	1199	11	
Coal, Campbell Creek, (No. 2 Gas)	3	8	1203	7	48′ 8″
Fire clay to bottom	2	0	1205	7	

Passing 5 miles southeastward to near the head of Right-hand Fork of Rum Creek, the following succession of the Kanawha Series is obtained by combining an aneroid section measured by Hennen from the summit of the point southwest of the residence of B. F. Justice northeastward to the top of Bore Hole No. 86 on Map II, with the detailed record of the latter boring as kindly furnished the Survey by John Hunter, Superintendent of the Dingess-Rum Coal Company. It apparently reaches up very near to the base of the Allegheny Series or top of the Homewood Sandstone:

Rum Creek Section.

	Thickness Feet.	Total Feet	
Concealed, with sandstone, Homewood, from top of point	60	60	
Sandstone, Homewood	10	70	
Concealed	50	120	
Sandstone, massive, Upper and Lower Coalburg	170	290	
Concealed	60	350	
Sandstone, massive	15	365	
Concealed	20	385	
Sandstone, flaggy	10	395	
Concealed	35	430	
Concealed, with shale	15	445	
Coal, blossom, Winifrede, visible, 0′ 3″, (1425′ B.)	0	445	445′
Concealed	65	510	
Concealed, with sandstone	85	595	
Concealed to bench (Chilton Coal horizon)	15	610	165′
Concealed	50	660	
Sandstone	25	685	
Concealed	60	745	
Concealed, with sandstone	20	765	
Sandstone, massive	10	775	
Concealed	35	810	
Sandstone, massive, Upper Cedar Grove	10	820	
Shale, dark gray	7	827	
Coal, Cedar Grove (2′ 8″), (1041′ L.)	3	830	220′
Concealed	3	833	
Sandstone, massive, Middle Cedar Grove, upper portion	15	848	
Concealed to top of Dingess-Rum Coal Co. Bore Hole No. 6 (No. 86 on Map II)	2	850	20′

(Continued with log of Boring No. 86 on Map II; Elevation, 1023′L.)

	Ft.	In.	Ft.	In.		
Sandstone, Middle Cedar Grove	35	2	885	2		
Shale	10	0	895	2		
Shale, coal, and bone, Lower Cedar Grove	5	5	900	7	50′	7″
Shale	23	11	924	6		
Coal, Alma, (947′ L.)	1	7	926	1	25′	6″
Fire clay	1	1	927	2		
Sandstone, Logan	52	10	980	0		
Shale	32	0	1012	0		
Sandstone	12	6	1024	6		
Shale	1	8	1026	2		
Coal, Little Alma	1	0	1027	2	101′	1″
Shale	2	0	1029	2		
Sandstone, Peerless	49	4	1078	6		
Shale	1	8	1080	2		
Coal, Campbell Creek, (No. 2 Gas)	5	7	1085	9	58′	7″
Slate to bottom	3	0	1087	9		

Triadelphia District, Logan County.

Triadelphia District occupies the southeastern portion of Logan County, in which region the members of the Kanawha Series approach their maximum development, especially above the Campbell Creek Coal. Several sections therein on the waters of Buffalo Creek will now be given from west to east.

The following accurate spirit-level determination of the intervals between important coals of the Kanawha Series on the southwest hillside of Right Fork of Buffalo, 2900 feet southeast of the mouth of the former, was kindly furnished the Survey by A. Cunningham of Logan, the correlation of the coals being determined by Hennen:

Accoville Section.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.	
Coal, Chilton (1489′ L.)..........	3	0	3	0	
Interval	280	3	283	3	
Coal, Cedar Grove, (1204′ L.).....	4	9	288	0	285′ 0″
Interval	43	6	331	6	
Coal, Lower Cedar Grove (1157′ L.)	3	4	334	10	46′ 10″
Interval	183	1	517	11	
Coal, Campbell Creek (No. 2 Gas) (966′ L.)....................	7	11	525	10	191′ 0″

The following section was measured with aneroid by Hennen down the south hillside of Buffalo Creek from the summit of a high knob to an opening in the Campbell Creek (No. 2 Gas) Coal, one-half mile east of Sherman:

Sherman Section.

			Thickness Feet.	Total Feet
Sandstone, grayish white, capping knob..............	50′	Homewood Sandstone	120	120
Concealed	10			
Sandstone, grayish white, partly concealed........	60			
Concealed along bench (Stockton Coal horizon)			30	150
Sandstone, Upper and Lower Coalburg, greenish gray, and grayish white, flaggy			195	345
Concealed and sandstone, medium grained, yellowish white........................			35	380
Concealed along bench.....................			10	390

		Thickness Feet.	Total Feet.	
Sandstone, Upper Winifrede, medium grained, grayish brown, flaggy		55	445	
Concealed along bench (Winifrede Coal horizon)		25	470	
Concealed, mostly dove-colored, fine grained sandstone		195	665	
Shale		1	666	
Coal, gas 0' 9" Slate, gray 0 0½ Coal, gas 1 2 Slate, black 0 1 Coal, gas 1 1 Coal, splinty 0 11 Slate, dark gray 0 2 Coal, splinty 3 4	(7' 6½") Chilton (1416' L.)	8	674	674'
Fire clay and concealed		55	729	
Sandstone, massive, Hernshaw		85	814	
Concealed		130	944	
Sandstone, shaly, Upper Cedar Grove		5	949	
Coal, gas 2' 4" Slate, 0 1 Coal, splinty 2 8	(5' 1") Cedar Grove (1136' L.)	5	954	280'
Slate, concealed, and slate, black		245	1199	
Coal, gas 1' 4" Slate, gray 0 0½ Coal 0 1 Slate, gray 0 1 Coal 0' 9" to 0 11 Shale, gray 0 2 Coal, splint 2 6 Shale, gray 0 0½ Coal 0 4	(5' 6") Campbell Creek (No. 2 Gas) (886' L.)	5	1204	250'
Fire clay				

The following section was measured 2 miles northeastward with aneroid by R. M. Gawthrop from the top of the ridge ½ mile east of Robinette northward to the bed of Buffalo Creek:

Robinette Section.

	Thickness Feet.	Total Feet	
Sandstone, massive, gray, coarse grained, micaceous, soft, forms cliff to top of ridge; 10 feet at top is rather flaggy; Upper Coalburg	50	50	
Concealed, with sandstone	40	90	90'
Sandstone, massive, coarse, grayish-brown, Lower Coalburg	30	120	
Concealed	10	130	
Sandstone, brown, flaggy, medium hard	30	160	
Concealed, with sandstone	55	215	
Concealed to bench	20	235	
Concealed	15	250	

	Thickness Feet.	Total Feet.	
Sandstone, brown, hard, fine grained, Upper Winifrede	5	255	
Concealed, with sandstone	75	330	
Sandstone, flaggy, brown, micaceous, medium hard, forms cliff, Lower Winifrede	35	365	
Concealed, mostly sandstone, making steep bluff	70	435	
Concealed	50	485	
Coal, (prospect opening, thickness concealed; reported 8 feet thick), **Chilton**, (1439′ L.)	0	485	395′
Concealed	30	515	
Sandstone, massive, brown, micaceous, fine grained, with plant fossils in basal portion, Hernshaw	85	600	
Concealed	10	610	
Shale, dark, medium hard, silicious	15	625	
Sandstone, flaggy, fine grained	10	635	
Concealed	10	645	
Sandstone, flaggy	3	648	
Shale, gray	2	650	
Sandstone, massive, fine grained, micaceous	13	663	
Coal 0′ 3″ Shale 2 0 Coal 0 8 **Williamson** (2′ 11″)	3	666	181′
Sandstone, flaggy	13	679	
Shale, gray, silicious	6	685	
Sandstone, massive, fine grained, grayish-brown, micaceous, Upper Cedar Grove	45	730	
Concealed	23	753	
Coal, (thickness concealed; reported 3 feet thick), **Cedar Grove**, (1171′ B.)	0	753	87′
Concealed	122	875	
Shale, dark gray, silicious	5	880	
Concealed	20	900	
Shale, with limestone boulders imbedded, Campbell Creek Limestone horizon	10	910	
Sandstone, flaggy	10	920	
Concealed	42	962	
Sandstone, massive	5	967	
Coal, gas 0′ 11″ Coal, slaty 0 6 Coal, gas 0 8 Coal, semi-splint 2 0 (4′ 1″) **Campbell Creek (No. 2 Gas)** (953′ L.)	4	971	218′
Concealed to bed of Buffalo Creek	10	981	

Passing 3 miles southward to near the head of Right Fork of Buffalo, the following section was measured from the summit of a high knob by R. M. Gawthrop northwestward to the mouth of North Branch:

Buffalo Creek Section.

				Thickness Feet.	Total Feet	
Interval, estimated, from top of knob				300	300	
Sandstone				25	325	
Concealed, with sandstone and shale				40	365	
Shale, gray				10	375	
Sandstone, flaggy				40	415	
Sandstone, massive, hard, fine grained, micaceous, Upper Chilton				137	552	
Coal	0'	4"	(15' 8") Chilton, upper bench (1738' B.)	16	568	568'
Shale	5	0				
Coal	0	2				
Bone	0	2				
Shale	0	1				
Coal, splint	2	8				
Shale	0	1				
Coal	0	2				
Fire clay	2	0				
Shale, gray	3	0				
Coal, hard	2	0				
Shale, gray				8	576	
Sandstone, flaggy				5	581	
Shale, grayish brown, silicious				7	588	
Coal	1'	6"	(5' 1") Chilton, lower bench (1713' B.)	5	593	25'
Bone	0	2				
Shale, hard	0	6				
Coal	0	1				
Shale, gray	0	3				
Coal, splint	1	5				
Slate	0	1				
Coal, soft	0	10				
Shale	0	1				
Coal	0	2				
Fire clay shale, hard				10	603	
Sandstone, massive				20	623	
Coal, hard	0'	8"	(10' 2") Little Chilton (1673' B.)	10	633	40'
Bone	0	2				
Shale, gray	0	6				
Coal	1	10				
Fire clay and shale, silicious	6	0				
Coal, medium hard	1	0				
Fire clay shale				3	636	
Sandstone, massive, gray, micaceous				42	678	
Concealed				145	823	
Sandstone, massive, Upper Cedar Grove				8	831	
Concealed				35	866	
Coal, Cedar Grove (2' 8" visible), (1430' B.)				3	869	236'
Concealed, with fire clay				10	879	
Coal, Lower Cedar Grove, (1419' B.)				1	880	11'
Concealed, with sandstone				20	900	
Sandstone				5	905	
Concealed				10	915	
Sandstone, massive				5	920	
Concealed				40	960	

	Thickness Feet.	Total Feet.	
Sandstone, hard, gray	5	965	
Concealed	5	970	
Sandstone, flaggy, fine grained	5	975	
Concealed, with sandstone	65	1040	
Sandstone, massive, fine grained, micaceous	5	1045	
Concealed	10	1055	
Sandstone, flaggy	10	1065	
Concealed	7	1072	
Shale, gray	3	1075	
Sandstone, flaggy	3	1078	
Shale, gray	3	1081	
Coal, soft.........0' 4 " Slate ....0 0½ Coal, soft.........2 4½ } Campbell Creek (No. 2 Gas)... (1215' B.)	2' 9"	1084	204'
Concealed	12	1096	
Sandstone	4	1100	
Concealed	10	1110	
Sandstone, flaggy	15	1125	
Concealed	25	1150	
Sandstone, flaggy, coarse, grayish brown, micaceous	10	1160	
Concealed to mouth of North Branch	15	1175	

The above section shows the Chilton Coal badly split up with shale and slate and expanded to a total section of 41 feet, including both benches and the intermediate shales and sandstone.

Harvey District, Mingo County.

Harvey District occupies the northern point of Mingo County in a region where the highest ridges, rising above the Kanawha Series, are capped with a considerable thickness of the Allegheny Measures. In the extreme northern edge of the district, Reger measured with aneroid the following section about one-half mile up Cub Branch of East Fork of Twelvepole, 1¾ miles northeast of Breeden, from the summit of a high knob northeastward to a stripping in what appears to be the Chilton Coal:

Cub Branch Section.

	Thickness Feet.	Total Feet.	
Allegheny Series (230')			
Shale, from top of knob	30	30	
Sandstone, massive, pebbly, East Lynn	130	160	
Concealed in bench (No. 5 Block Coal horizon)	10	170	170'
Concealed in bluff	60	230	
Kanawha Series (475')			
Concealed in bluff	100	330	

	Thickness Feet.	Total Feet.	
Concealed in bench	20	350	
Concealed in slope	65	415	
Coal digging, Coalburg, (mostly concealed) (1115' B.)	5	420	250'
Concealed in bluff	55	475	
Concealed in bench	10	485	
Concealed, mostly sandstone	120	605	
Concealed in bench	5	610	
Concealed in slope	30	640	
Coal blossom, Chilton "A," (895' B.)	0	640	220'
Sandstone, massive	30	670	
Shale and concealed to forks of branch	10	680	
Shale, sandy, to **coal stripping, Chilton, (830' B.)**	25	705	65'

In the above section, owing to poor barometric conditions and the fact that it was measured in descending order down the dip, the intervals are greater than they should be.

Passing 7 miles southeastward to the eastern portion of Harvey District, the following section of the Kanawha Rocks was measured with aneroid by Reger southwestward along the hill road on the head of Dingess Trace Branch, one mile northeast of the town of Dingess:

Dingess Trace Branch Section.

	Thickness Feet.	Total Feet	
Concealed from summit at low gap	30	30	
Sandstone	10	40	
Shale and concealed	15	55	
Sandstone, Upper Chilton	45	100	
Concealed	20	120	
Coal, Chilton, (1160' B.)	2	122	122'
Fire clay	3	125	
Sandstone and concealed	25	150	
Sandstone, massive	75	225	
Concealed	35	260	
Shale, gray	5	265	
Coal 1' 0" Slate, black 0 2 **Coal, visible** 1 0 } (2' 2") **Dingess** (1015' B.)	2	267	145'
Fire clay and sandy shale	43	310	
Coal, Williamson, (0' 3"), (970' B.)	0	310	43'

Warfield District, Mingo County.

In the extreme western edge of Warfield District, the following section was measured with aneroid by Reger down the north hillside of Marrowbone Creek, ½ mile below the mouth of Brewer Branch. It is of special interest in that the Dingess Limestone and several coals are represented. The vein, locally known as the "Warfield Coal", is shown to be the Campbell Creek or "No. 2 Gas" bed of the Kanawha Valley, thus confirming its first correlation by I. C. White in 1884:

Marrowbone Section.

	Thickness Feet.	Total Feet	
Sandstone, massive	15	15	
Concealed and sandy shale	15	30	
Sandstone, massive	15	45	
Shale, dark, coaly (Dingess Coal horizon)	3	48	
Shale, dark	11	59	
Limestone, Dingess, (748' B.)	1	60	60'
Shale, sandy and ferriferous	14	74	
Coal, Williamson (733' B.)	1	75	15'
Fire clay shale	3	78	
Sandstone, massive, Upper Cedar Grove	32	110	
Concealed	5	115	
Coal streak, Cedar Grove, (693' B.)	0	115	40'
Shale, sandy, partly concealed	54	169	
Shale, ferriferous	1	170	
Coal, Alma, (2' 4"), (636' B.)	2	172	57'
Shale, sandy	8	180	
Sandstone, massive, Peerless	15	195	
Coal, Campbell Creek, "Warfield," (3' 2"), (610' B.)	3	198	
Slate, concealed, and sandstone, to creek	8	206	

Lee District, Mingo County.

In the western point of Lee District, the following section changed to conform with the results of the investigations in the field during 1913, and published on page 416 of Volume II(a) of the State Survey Reports, was measured with aneroid by Hennen southwestward from the summit of a high knob via the old Culross Mine in the Buffalo Creek Coal, to railroad grade, ½ mile below Hatfield Station:

Hatfield P. O. Section.

	Thickness Feet.	Total Feet.
Allegheny Series (130')		
Sandstone, massive, reddish, East Lynn, caps high knob	100	100
Concealed, sandstone, etc	30	130

	Thickness Feet.	Total Feet.
Kanawha Series (875′)		
Sandstone, massive, Homewood and concealed	85	215
Sandstone, massive, and concealed to coal **blossom, Stockton,** upper bench.........	85	300
Sandy shales............................	8	308
Coal, splint, Stockton, lower bench, (once mined, now fallen in)..................	4	312
Concealed and sandstone, massive..........	170	482
Coal, splint.........1′ 6″ (3′ 9″)		
Coal, soft...........0 1 **Buffalo Creek** ..	3.7	485.7
Coal, splint..........2 2 (1160′ B.)		
Concealed, massive sandstone, and concealed	370.3	856
Coal, semi-splint, blocky, (once mined), Williamson ....3′ to	4	860
Concealed, sandstone. and concealed, to N. & W. R. R. grade at tipple to old Culross Mine, ½ mile N. of Hatfield......	145	1005

The above section shows two benches of the Stockton Coal as exhibited in the Rawl Section.

Passing 11 miles eastward in the same district, the following section of the Kanawha Rocks was measured with aneroid by Reger down the north hillside of Rockhouse Fork of Pigeon, ¾ mile east of the mouth of Big Pigeonroost Branch:

Rockhouse Fork Section.

	Thickness Feet.	Total Feet	
Sandstone, massive, capping knob, Upper Coalburg	80	80	
Coal, prospect, Coalburg, (thickness concealed; reported 4′ to 6′), (1620′ B.)...	5	85	85′
Concealed	20	105	
Sandstone, massive, making cliff, Lower Coalburg	85	190	105′
Concealed	25	215	
Sandstone, massive, pebbly, making cliff, Upper Winifrede.........................	80	295	105′
Concealed	25	320	
Sandstone, Lower Winifrede and Upper Chilton Sandstones......................	80	400	
Concealed	75	475	
Sandstone	55	530	
Concealed in bench......................	5	535	
Sandstone	55	590	
Concealed in bench......................	10	600	
Sandstone	60	660	
Concealed	115	775	
Sandstone to bed of Rockhouse Fork.......	15	790	
Interval to **Campbell Creek Coal,** estimated..	250	1040	

The following partial section of the Kanawha Rocks was carefully measured by Hennen with hand-level at the west portals of the Hatfield Tunnels, one mile west of Matewan. It is of special interest in that an accurate measurement is given for the interval between the Matewan and the Powellton—"Hatfield Tunnel"—Coals.

Hatfield Tunnel (West Portal) Section.

		Thickness Feet.	Total Feet	
Concealed				
Shale, sandstone, and shale, dark		18.7	18.7	
Coal ....0' 0½"	(1' 4") Powellton "Hatfield Tunnel" (720' L.)	1.3	20	20'
Shale, gray.....0 2				
Coal 0 3				
Slate, coaly....0 6¼				
Coal 0 1				
Slate, black....0 0¾				
Coal 0 8½				
Shale, dark, laminated		7	27	
Sandstone, massive, and shale, sandy, dark		22	49	
Concealed		5	54	
Shale, dark		10	64	
Concealed		8	72	
Sandstone, massive		7	79	
Coal, Matewan, (660' L.)		1	80	60'
Fire clay and concealed to river		17	97	

Magnolia District, Mingo County.

The following hand-leveled section was measured by Hennen at the eastern portal of the same tunnel, and exhibits the position of the locally known "Hatfield Tunnel" Coal to the well determined Brownstown Sandstone:

Hatfield Tunnel (East Portal) Section.

		Thickness Feet.	Total Feet
Sandstone, massive, great cliff, Brownstown		40	40
Shale, sandy		1.5	41.5
Coal, Powellton "A," (4" to 6"), (762' L.)		0.5	42
Sandstone, dark, laminated		19.3	61.3
Coal ....0' 7½"	Powellton (1' 8") "Hatfield Tunnel" (741' L.)	1.7	63
Slate 0 0½			
Coal 1 0			
Sandstone, shaly		5	68
Sandstone, dark, laminated		41	109

Passing 3½ miles southeastward in Magnolia District, the following section, published on pages 315-316 of Volume II(a) of the State Geological Survey Reports, and changed to conform to the new interpretation of the Kanawha Series of Tug Fork, was measured by I. C. White with aneroid southwestward from the summit of a high hill, ¾ mile northeast of Thacker, via the old Maritime Mine (now abandoned) on the Cedar Grove ("Upper Thacker") Coal. The intervals between coals are slightly less than they should be owing to the fact that the measurement is in descending order for a distance of three-fourths mile on the rise of the strata:

Maritime Mine Section.

			Thickness		Total		
			Ft.	In.	Ft.	In.	
Sandstone, massive, gray			40	0	40	0	
Concealed, and massive, coarse, yellow sandstone			120	0	160	0	
Shales, concealed			75	0	235	0	
Sandstone			5	0	240	0	
Shales and concealed			20	0	260	0	
Sandstone, massive, micaceous, Upper Cedar Grove			60	0	320	0	
Shales, sandy			2	0	322	0	
Coal, Cedar Grove "Rider"?			1	0	323	0	
Shales, sandy			16	0	339	0	
Coal, not hard	3′	4″					
Coal, splint	2	2					
Fire clay shales	1	5					
Splint coal	0	10					
Slate, dark	0	1					
Coal, soft	0	6					
Clay	0	0½					
Coal	0	1½					
Clay	0	0½					
Coal	0	4½					
Clay	0	2					
Coal	1	5					
Shales, sandy, gray	10	0					
Coal, splint	1	9					
Cedar Grove, "Upper Thacker" (1250′ B.)			22	3	361	3	361 3″
Sandstone, massive, gray, coarse, Middle Cedar Grove			40	0	401	3	
Concealed			150	0	551	3	
Coal, blossom, Campbell Creek, (No. 2 Gas)			0	0	551	3	190′ 0″
Sandstone, massive, and concealed			80	0	631	3	
Flaggy sandstone, sandy shales, and concealed			80	0	711	3	
Sandstone, very massive, Matewan			55	0	766	3	
Sandy shales and concealed			40	0	806	3	

	Thickness		Total		
	Ft.	In.	Ft.	In.	
Coal, and fire clay, thin, Eagle	..	..	806	3	255' 0"
Concealed	25	0	831	3	
Sandy shales	5	0	836	3	
Sandstone	15	0	851	3	
Concealed	10	0	861	3	
Coal ....0' 6" Fire clay ..1 2 Coal ....0 6 } Little Eagle Coal	2	2	863	5	
Shales and sandstone	14	0	877	5	
Coal, Cedar, good, at N. & W. Railway level at Thacker	1	11	879	4	73' 1"

About one-half mile west of Thacker, the following section was measured with aneroid by Hennen down the north hillside of Tug Fork:

Rose Siding Section.

	Thickness Feet.	Total Feet.	
Sandstone, massive, cliff rock, Middle Cedar Grove, upper portion	30	30	
Concealed	50	80	
Coal, blossom, Lower Cedar Grove	5	85	85'
Sandstone, massive, Lower Cedar Grove	55	140	
Concealed	43	183	
Coal, Little Alma, (2' 0") (1110' B.)	2	185	100'
Sandstone, cliff	55	240	
Concealed	25	265	
Coal, Campbell Creek, (No. 2 Gas), (1025' B.)	5	270	85'
Concealed and shale, sandy	25	295	
Sandstone, massive, Brownstown	55	350	
Sandstone, flaggy, dark	20	370	
Concealed	5	375	
Sandstone, flaggy and shaly, dark	39	414	
Limestone, Stockton, 6" to	1	415	145'
Shale and concealed	15	430	
Sandstone, Matewan	60	490	
Concealed and shale	20	510	
Sandstone, flaggy	12	522	
Concealed	10	532	
Sandstone	3	535	
Coal, slaty, Eagle, (0' 6"), (760' B.)	0.5	535.5	120½'
Fire clay shale and concealed	9.5	545	
Shale, dark, with iron ore nuggets, and sandstone, massive	35	580	
Coal, gas....0' 7½" Shale, gray..0 5 Coal ....0 5½ } (1' 4") Little Eagle (703' L.)	1.3	581.3	45.8'
Shale and sandstone			

The following section was measured with aneroid by Hennen down the east hillside of Tug Fork to N. & W. Railway grade, ½ mile southeast of Thacker:

Thacker Section.

		Thickness Feet.	Total Feet.	
Coal opening, (closed), **Cedar Grove,** "Upper Thacker" (1310′ B.)		0	0	
Concealed		45	45	
Sandstone, massive, Middle Cedar Grove		30	75	
Concealed		35	110	
Coal blossom, Alma (1200′ B.)		0	110	110′
Shale and concealed		10	120	
Sandstone, massive, great cliff, Logan		50	170	
Concealed		45	215	
Sandstone, slaty		5	220	
Concealed		5	225	
Coal blossom, Campbell Creek (No. 2 Gas), (1085′ B.)		...	225	115′
Concealed		30	255	
Sandstone, massive, great cliff, Brownstown		80	335	
Concealed		70	405	
Sandstone, massive, great cliff, Matewan		50	455	
Concealed		140	595	
Coal blossom, Little Eagle		1	596	371′
Shale, sandy, and sandstone, shaly		13	609	
Coal, gas.......0′ 1¾″	(2′ 4¼″) **Cedar**	2.3	611.3	
Slate, gray.....0 0¼				
Coal, gas.......0 3½				
Slate, gray.....0 0¼				
Coal, gas.......0 9				
Coal, splinty....1 1½				
Fire clay shale		3	614.3	
Sandstone, massive, Grapevine, to railroad grade		1	615.3	19.3′

Passing a mile and a quarter farther up Tug Fork along the N. & W. Railway, the following section, published on page 316 of Volume II(a) of the State Geological Survey Reports and changed to conform with the investigations in the field during 1913, was measured by I. C. White with aneroid at the Grapevine Mine in the Cedar Grove—"Upper Thacker"—Coal:

Grapevine Mine Section:

	Thickness Feet.	Total Feet.	
Sandstone, massive			
Slate	4	4	
Coal ("Thacker"), **Cedar Grove, in many divisions, separated by clays and shales**	12	16	16′
Concealed	5	21	
Sandstone, massive, Middle Cedar Grove	65	86	
Coal, Lower Cedar Grove, "Lower Thacker," reported	5	91	75′

	Thickness Feet.	Total Feet.	
Concealed	25	116	
Mostly sandstone and concealed	200	316	
Concealed and sandstone	310	626	
Coal, (same as at track level at Thacker), Cedar	2	628	537′
Concealed to N. & W. Railway	75	703	75′

The following section was measured with aneroid by Hennen along the same hillside of Tug Fork southwestward to N. & W. Railway grade, 0.2 mile above Delorme. It is very interesting, as the basal member represents the marine fossiliferous Eagle Shale:

Delorme Section.

	Thickness Feet.	Total Feet.	
Bench for Campbell Creek (No. 2 Gas) and "Rawl" Coal	...	....	
Sandstone, massive, blocky, great cliff, Brownstown	60	60	
Shale, buff	5	65	
Concealed and shale	95	160	
Sandstone, massive, medium grained, gray and brown, Matewan	55	215	
Concealed and shale	20	235	
Sandstone, blocky and flaggy	18	253	
Concealed	7	260	
Coal blossom, horizon, Eagle ("Middle War Eagle")	...	260	260′
Fire clay shale, and shale	5	265	
Sandstone, massive top, shelly bottom, Decota	50	315	
Shale, gray	0.5	315.5	
Coal, soft 0′ 9″ Shale, gray 0 1 **Coal, soft** 0 7 } **Little Eagle.** (825′ B.)	1.5	317	57′
Fire clay shale	3	320	
Sandstone, massive	23	343	
Coal, Cedar	2	345	28′
Sandstone, massive, Grapevine	55	400	
Shale, black, Eagle, marine fossils, brachiopods, etc., to railroad grade 1/5 mile above Delorme	15	415	70′

Passing 4 to 5 miles farther southeastward, the following section was measured with aneroid by Hennen from the summit of a knob, ½ mile northeast of Devon, southwestward to the N. & W. Railway grade at the latter place:

Devon Section.

	Thickness Feet.	Total Feet.	
Concealed and shale from top of knob	245	245	
Sandstone, massive, Brownstown	35	280	
Concealed, mostly shale	105	385	
Concealed and shale in bench	15	400	
Sandstone, massive, forming cliff, Matewan	75	475	
Concealed, mostly shale	20	495	
Sandstone, shale, and concealed, flaggy	45	540	
Coal blossom, Cedar, (1015' B.)	...	540	540'
Concealed and shale	5	545	
Sandstone, massive, forming cliff, Grapevine	65	610	
Shale, Eagle, dark, sandy, marine fossils, partly concealed	54	664	
Limestone, dark gray, silicious, lenticular	1	665	
Shale, sandy, and sandstone, shaly, with iron ore nodules	10	675	
Concealed and shale (horizon of Lower War Eagle Coal)	10	685	145'
Sandstone, massive, forming cliff, Upper Gilbert	55	740	
Shale, black	10	750	
Sandstone, shaly bottom, massive top	10	760	
Shale	1	761	
Coal, Glenalum Tunnel, (785' B.)	2	763	
Fire clay	2	765	
Sandstone, shaly, bluish	10	775	
Sandstone, massive, medium grained, bluish-gray, Lower Gilbert, to railroad grade	15	790	

Stafford District, Mingo County.

Stafford District occupies the southeastern portion of Mingo County, and its outcropping rocks reach 120 to 150 feet below the base of the Kanawha Series. In the extreme northern edge of the district, the following section, in which the coals were correlated by Hennen, was measured by John Hunter, Superintendent of the Dingess-Rum Coal Co., of Logan, W. Va., southward down "Graveyard Hollow" from the summit of a high knob to the bed of Browning Fork of Horsepen, 1.15 miles due north of the mouth of the latter stream. The section is important on account of the number of coals represented:

Browning Fork Section.

	Thickness Feet.	Total Feet.	
Unrecorded	408	408	
Coal, Dingess, (2' 1"), (1665' B.)	2	410	410'
Unrecorded	122	532	

	Thickness Feet.	Total Feet.	
Coal, Cedar Grove, (3' 1"), (1540' B.)	3	535	125'
Unrecorded	55	590	
Coal, Lower Cedar Grove, (5' 8"), (1480' B)	5.6	595.6	60'
Unrecorded	61.4	657	
Coal 1' 10" Slate 1 10 Coal 5 0 (8' 8") Alma (1410' B.)	8.6	665.6	70'
Unrecorded	113	778.6	
Coal, Campbell Creek, upper bench (2' 2"), (1295' B.)	2	780.6	115'
Unrecorded	28	808.6	
Coal, Campbell Creek, lower bench (2' 3"), (1265' B.)	2.4	811	30'
Unrecorded	148	959	
Coal, Matewan, (2' 0"), (1115' B.)	2	961	150'
Unrecorded to mouth of "Graveyard Hollow" and bed of Browning Fork	130	1091	

Passing to the southwestern edge of Stafford District, the following section was measured with hand-level by Hennen at the east portal of the new N. & W. Railway tunnel (just completed) at Glenalum Junction. The section is of special interest in that it exhibits a section of the Glenalum Tunnel Coal at its type locality, and the relative position of this vein to the Lower War Eagle Coal and the Upper and Lower Gilbert Sandstones:

Glenalum Tunnel Section.

	Thickness Feet.	Total Feet.	
Coal, Lower War Eagle			
Sandstone, massive, Upper Gilbert	60	60	
Shale, black, iron ore nodules	15	75	
Sandstone, massive, bluish-gray, laminated	20	95	
Coal, gas, soft 1' 3" Shale, gray, 1' 3" to 2 0 Coal, gas, soft 1 0 Slate, black 0 8 Coal, gas 0 3 Slate, black 0 7 Shale, dark, sandy, with thin streaks of coal 10 0 Coal, gas 0 1½ Shale, gray 0 2½ Coal, gas 0 4 Sandstone, shaly, bluish 13 0 Coal, gas 0 6 (29' 10") Glenalum Tunnel (855' B.)	30	125	125'
Sandstone, massive, Lower Gilbert, to railroad grade	31	156	

As shown above, the Glenalum Coal is badly split up with interlaminated layers of shale and slate, since in a total section of 29′ 10″ there are only 41½ inches of coal.

In the southeastern portion of Stafford District, the rock succession of the Kanawha Series on Turkey Creek and just opposite the mouth of the latter stream in the edge of Virginia, is exhibited in the War Eagle Section, page 88.

DESCRIPTION OF FORMATIONS.

The Homewood (Roaring Creek) Sandstone.

The Homewood Sandstone of the Pennsylvania Survey, or the "Roaring Creek" of I. C. White,[1] is the highest member of the Kanawha Series. In Logan and Mingo it is a great, massive, grayish white and brown rock, frequently pebbly and much current bedded, ranging in thickness from 75 to 100 feet and generally forming high cliffs near the summits of ridges and knobs. As this stratum closely underlies the No. 5 Block Coal bed, the area of its crop should follow near the same regions as outlined on Map II for the latter. A glance at this map shows that it has been entirely eroded even from the summits of the highest hills along the crest of the Warfield Anticline across Logan County; and over the entire area of Stafford District, Mingo, except a few isolated knobs in the northwest edge. Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV and in this Chapter in the sections for Holden, Whitman, Rum Creek and Sherman.

Only one quarry in it was observed within the two counties, this being in the northern portion of Mingo, near the summit of the hill, ½ mile southwest of Dingess. Here, according to Reger, it belongs at an elevation of 1510′ B., and is soft, gray, massive, splitting readily into large blocks and weathering brown. The quarry is 200 feet long and the face 40 feet high. Stone from the same was used in the construction of the portals to the long Norfolk & Western Railway tunnel at Dingess.

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[1] Vol. II(A), W. Va. Geol. Survey, pp. 488-489; 1908.

The Kanawha Black Flint.

The Kanawha Black Flint, belonging between the last sandstone described and the Stockton Coal in Kanawha and Fayette Counties, disappears southwestward from the latter region, and in Boone, Logan and Mingo Counties, its horizon is represented by shale.

The Stockton Coal.

The Stockton Coal of the Kanawha River region, belonging there just below the Kanawha Black Flint, was traced southwestward across Boone County into the territory of this Report, where it has practically the same character as in the first mentioned locality, being multiple bedded and much split with slate and shales. In fact, there are frequently two benches, each of minable thickness, separated as at Rawl by 25 to 30 feet of sandy shales. The detailed structure of the coal, along with a description of the minable area and composition at several prospect openings scattered throughout the two counties, is given on subsequent pages in Chapter VIII. Its thickness and relative position in the rock column are exhibited in the general sections in Chapter IV for Ethel, Oilville, Manbar-Man, Naugatuck, Ragland, Chattaroy, Rawl and Williamson; in this Chapter in the special sections of the Kanawha Series for Stollings and Hatfield; and in Chapter VIII in the records of Coal Test Borings Nos. 57 and 59 on Map II. As this bed belongs only 125 to 150 feet below the No. 5 Block Coal, its crop should follow roughly the same regions as outlined on Map II for the crop of the latter. As shown in the Chapter last mentioned, this bed exists in minable thickness over quite a large area of the territory of this Report, but owing to the fact that it occurs high up near the summits of the knobs and ridges, it has not been feasible thus far to open any commercial mines on the same.

The Upper Coalburg Sandstone.

The Coalburg Sandstone of White,[2] belonging in the interval separating the Stockton and Coalburg Coals, attains a fine development in Logan and Mingo. In these counties, this stratum has been designated the **Upper Coalburg Sandstone** in contradistinction to the Lower Coalburg Sandstone immediately underlying the Coalburg Coal, the latter being almost as prominent a cliff maker as the former sandstone. The Upper Coalburg is generally a great, massive, coarse, bluish gray and brown rock, ranging in thickness from 50 to 80 feet, and often weathering into "chimney towers" and "table rocks" when exposed near the summits of knobs, ridges and on long points. Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV; in the special sections of the Kanawha Series in this Chapter; and in the records of Coal Test Borings Nos. 57 and 59 on Map II. This sandstone is one of the most prominent cliff makers in the two counties, and, as it lies immediately over the Coalburg Coal, its crop should follow the same regions as outlined in detail on Map II for the latter. It is this stratum that forms the great cliff—80 to 90 feet high—100 feet below the summit of the knob, 0.4 mile northwest of Naugatuck, where it offers a fine exposure for quarrying. No quarries were observed on this ledge in either county.

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[2] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 468; 1908.

The Coalburg Coal.

The Coalburg Coal of White,[3] belonging 125 to 150 feet below the Stockton Coal and at 0 to 10 feet below the last sandstone described, attains a fine development in the territory of this Report. As in its type locality in the Kanawha Valley, it is multiple bedded, containing much splint coal as also alternating layers of softer or "gas" coal, and two or more partings of shale and bone, or "nigger-head." The following is a general section in descending order of this seam as exhibited at prospect openings driven on the crop in Logan and Mingo Counties:

	Feet.	Inches.
Coal, semi-splint	1	6
Slate, black, 1" to	0	2
Coal, gas, with cannel streaks, 12" to	1	2
Slate, black, soft, 1" to	0	4
Coal, gas, bone and splint streaks, 9" to	2	0

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[3] I. C. White, Vol. II, W. Va. Geol. Survey, pp. 548-556; 1903.

	Feet.	Inches.
Coal and black slate, interlaminated, 12" to.....	1	8
Coal, splint, 16" to..............................	2	0
Total	8	10

Its crop is outlined in detail on Map II, and its thickness, detailed structure and relative position in the rock column are exhibited in the general sections for Clothier, Breeden, Hale, Kermit, Naugatuck, Myrtle, Chattaroy, Rawl, Sprigg and Williamson in Chapter IV; in the special sections of the Kanawha Series in this Chapter, for Beech Creek, Laurel Fork of Pine, Cub Branch and Rockhouse Fork; and in the records of Coal Test Borings Nos. 28, 52A, 57 and 59 on Map II, the details of which are given in Chapter VIII.

Owing to recent inquiries from other State Surveys as to the composition of **"nigger-head"** or **"bone coal,"** as the terms are used in the West Virginia Geological Survey Reports, a sample of the same was collected by D. D. Teets, Jr., from the Coalburg seam at the Coalburg-Kanawha Coal Company's mine at Coalburg, Kanawha County, during this year, the analysis of which, as reported by Messrs. Hite and Krak under Laboratory No. 201T, is as follows:

	Per cent.
Moisture	0.88
Volatile Matter..............................	22.37
Fixed Carbon	31.68
Ash	45.07
Total	100.00
Sulphur	0.38
Phosphorus	0.008

It is quite evident that the high ash content contributes very materially to the hardness of this particular form of bone coal; hence, the term "nigger-head."

This coal has never been mined on a commercial scale in Logan County, but in Mingo it has been shipped extensively for steam and domestic fuel. It is this bed that is mined at Blocton. It is the upper vein mined on Buffalo Creek, eastward from Chattaroy, and on Dick Williamson Branch, northeast of Rawl. Its thickness, character, fuel value and chemical composition at the several prospects and commercial mines, along with an estimate of the available tonnage by magisterial districts, are discussed at length in Chapter VIII.

The Little Coalburg Coal.

In northern Logan County a thin double bedded coal makes its appearance in the measures, being separated from the overlying Coalburg bed by 15 to 20 feet of fire clay and sandy shales. This vein has not been previously described, and is herein designated by the authors the **Little Coalburg Coal.** It is very probably a split off the main Coalburg bed. The following section, measured by Hennen at its crop on the west hillside of Beech Creek, 2½ miles southwest of Sharples and ¼ mile southeast of Coal Test Boring No. 53 on Map II, is typical of this bed in the territory of this Report:

				Feet.	Inches.
Coal, Coalburg, with partings				8	1½
Fire clay and sandy shale				11	0
Coal	1′	2″	Little Coalburg	2	3
Slate, black	0	2			
Coal	0	11			

Elevation of coal, 1185′ B.

Its thickness and stratigraphic position are exhibited in the Clothier-Beech Creek and Naugatuck Sections, pages 50-4 and 70-2, respectively.

In the same district, Gawthrop collected a sample of the Little Coalburg Coal for analysis and measured the following section at a prospect opening located 1.2 miles southwest of Sharples and ¼ mile southeast of the mouth of Left Fork of Beech Creek, at an elevation of 1150′ B.:

					Feet.	Inches.
1.	Coal, Coalburg, with partings				6	3
2.	Concealed (measured with aneroid)				54	0
3.	Shale, gray				3	0
4.	Coal, slaty	0′	6″	Little Coalburg	3	2
5.	Coal, soft	0	10			
6.	Bone	0	3			
7.	Coal, hard	1	7			

The composition of the sample from Nos. 5 and 7 only of section, as reported by Messrs. Hite and Krak under Lab. No. 5G, is given in the table of analyses at the end of Chapter VIII under **No. 19.** The results show it to be a very pure coal.

In the extreme eastern edge of Lee District, Mingo County, Gawthrop measured the following section in what appears to be the Little Coalburg Coal on the southeast hillside of Nighway Branch of Pigeon, 0.6 mile northeast of the mouth of the former:

			Feet.	Inches.
Sandstone, shaly			5	0
Coal, gas	1′ 0″	Little Coalburg	2	0
Slate	0 2			
Coal, gas	0 10			
Shale				

Elevation of coal, 1845′ B.

The coal is too thin and irregular to be classed as minable, but its horizon can be readily ascertained at any point, since the crop of the overlying Coalburg bed is outlined in detail on Map II.

The Lower Coalburg Sandstone.

In Logan and Mingo Counties, the interval separating the Coalburg Coal and the next minable vein—Buffalo Creek—below is generally occupied mostly by a massive, gray and brown, medium grained and arenaceous stratum, ranging in thickness from 30 to 50 feet and generally forming great cliffs around the hillsides, which has not previously been described. It is herein designated the **Lower Coalburg Sandstone.** Its thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Beech Creek, Logan, Ethel, Manbar-Man, Kermit, Chattaroy, Rawl, Little Coon Knob and Matewan; and in Chapter VI, for Mud Fork, Holden, Whitman, Rum Creek, Robinette and Rockhouse Fork. Since it belongs immediately below the Coalburg Coal, its crop follows closely the same areas as outlined for the latter on Map II. No quarries were observed on this ledge in either county, but, owing to its durable qualities, it should be adapted to building purposes in rough foundations. It frequently happens that this ledge coalesces with the Upper Coalburg into one great sandstone mass, ranging in thickness from 125 to 150 feet, and cutting away entirely the intervening coals. It should crush into a sand fairly well adapted to concrete work, owing to the sharpness of its sand grains.

The Buffalo Creek Coal.

The interval separating the Coalburg and Winifrede Coals expands from about 90 feet in the Kanawha Valley to slightly over 200 feet in the territory of this Report, where it generally holds a few feet above the middle a multiple bedded and splinty coal seam that has previously been described by I. C. White[4] from its fine development on Buffalo Creek in Mingo County. In the reference cited, its possible correlation with the Coalburg is suggested. The general sections in Chapter IV for Logan-Mingo-Lincoln Corner, Clothier, Manbar-Man, Ragland, Chattaroy, Rawl, Sprigg, Williamson and Matewan; in Chapter VI, in the special sections of the Kanawha Series for Stollings and Hatfield; and also the logs of Coal Test Borings Nos. 57 and 59 on Map II, exhibit its thickness, character and stratigraphic position in the rock column. This bed is represented in the Kanawha Valley as shown in the Hernshaw Section, page 44. At Shrewsbury, on the north side of the Kanawha River, a double bedded coal—3 feet in thickness—is present that appears to represent this seam, as it belongs only 110 feet below the Kanawha Black Flint and 41 feet (hand-leveled measurement in each instance) below the Coalburg Coal.

Returning to Mingo County, the following is a type section in the Buffalo Creek region:

		Feet.	Inches.	
1.	Sandstone, massive, roof.............			
2.	Coal, splinty, 3′ 0″ to	4	0	
3.	Coal, gas.....0 6 to	0	10	
4.	Shale. gray....2 0 to	0	2	
5.	Coal, splinty, 1 6 to	2	0	7′ 0″

On Dick Williamson Branch in Mingo County, the shale parting—No. 4 of section—frequently gets too thick to mine the total bed section successfully, and only Nos. 2 and 3 are then operated.

As this coal belongs 50 to 80 feet below the Coalburg bed, its horizon may be readily determined at any point, since the detailed crop of the latter is given on Map II. There are no commercial mines on this vein in Logan County, but in Mingo, it is being operated quite successfully on Buffalo Creek, and Goodman, Williamson and Dick Williamson Branches, where it has a great reputation as a steam and domestic fuel. Its thickness, composition and fuel value at these mines as well as at prospect openings and country banks are described at length in Chapter VIII.

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[4] Vol. II(A), W. Va. Geol. Survey, pp. 215-219; 1908.

The Buffalo Creek Limestone.

On Buffalo Creek and Dick Williamson Branch, Mingo County, there occurs a marine fossiliferous limestone, bluish gray in color, hard and brittle, and ranging in thickness from 6 to 15 inches, and belonging 60 to 80 feet below the Buffalo Creek Coal. As this stratum has not been previously described, it is herein designated the **Buffalo Creek Limestone*** from its association with the latter coal. Fossils were first observed at this horizon by Gawthrop on Island Creek in Logan County, at which place its relative position in the measures is exhibited in the Oilville Section, page 58. Later a marine fauna was found by Hennen in this limestone on Dick Williamson Branch in Mingo as shown in the Rawl Section, page 77. Fossils of the genera **Productus, Chonetes, Orbiculoidea** and **Derbya** abound, according to W. Armstrong Price, who made a cursory examination of a small collection. Owing to the fact that this limestone was not recognized until the close of the field work, it is not known whether both the limestone and marine fauna persist throughout the two counties. In the Kanawha Valley region, a careful search by Hennen and Krebs at Cedar Grove and Shrewsbury of the strata between the Coalburg and Cedar Grove Coals failed to reveal either the limestone or fossils. The thinning down of the measures in this direction and the great development of the Lower Coalburg, Upper and Lower Winifrede Sandstones very probably account for their disappearance in this portion of the State.

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*It is barely possible that this limestone may prove to be the same as the one found by White at Winifrede, Kanawha County, 65 feet under the Winifrede Coal, and described on page 431 of Vol. II(A).—I. C. W.

The Upper Winifrede Sandstone.

The Upper Winifrede Sandstone of White,[5] belonging immediately over the Winifrede Coal, has practically the same character as at its type locality in the Kanawha Valley, within the territory of this Report, being coarse, massive, gray and brown, often weathering into "chimney rock" columns, and ranging in thickness from 30 to 50 feet. Its thickness, character and relative position in the measures are exhibited in the general sections in Chapter IV; the special sections of the Kanawha Series in Chapter VI; and in the log of Coal Test Boring No. 57.

No quarries were observed on this ledge in either county, but as with the Coalburg Sandstones above, it should possess very durable qualities, and, owing to its highly silicious nature, should crush into sand fairly well adapted to concrete work. Its crop is about midway between the Coalburg and Chilton Coals, the details of which are shown by appropriate symbols on Map II.

The Winifrede Coal.

The Winifrede Coal of White,[6] belonging, at its type locality in Kanawha County, 175 to 200 feet below the Kanawha Black Flint, 75 to 100 feet below the Coalburg Coal and 75 to 90 feet above the Chilton Coal, has not been so carefully traced southwestward across Boone County to the territory of this Report as the two latter beds, owing largely to lack of prospects and openings on the same. The Chilton Coal especially has been accurately traced from the Lens Creek region of Kanawha County to Clothier and Ethel in Logan, and in the latter localities, the Winifrede Coal has been correlated with the thick coal belonging 140 to 150 feet above the Chilton vein and 175 to 200 feet below the great Coalburg seam, as exhibited in the Clothier-Beech Creek Section, page 50. Its thickness, character and relative position in the rock column in the two counties are shown in the sections for Manbar-Man, Breeden, Dingess, Hale, Kermit and Matewan in Chapter IV;

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[5] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

[6] I. C. White Bull. No. 65, U. S. Geol. Sur., p. 162; 1891; and Vol. II, W. Va. Geol, Sur., p. 556: 1903.

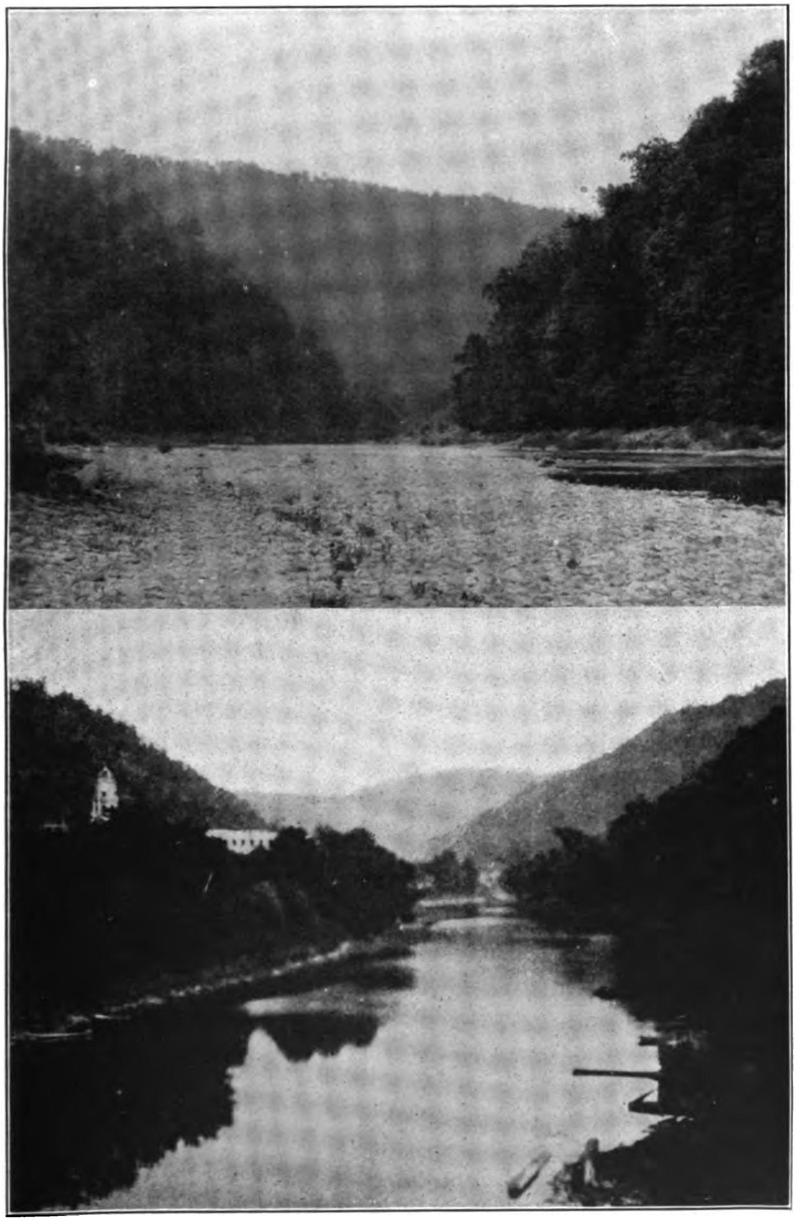

PLATE IV.—Showing rounded rocks in bed of Guyandot River, 2 miles south of Elk Creek, (above). and view of same river from C. & O. bridge at Logan (below), and showing topography of Kanawha Series in both.

for Beech Creek, Mud Fork, Stollings and Rum Creek in this Chapter; and in the logs of Coal Test Borings Nos. 57 and 59. The expansion of the Coalburg Coal—Winifrede Coal interval of the Kanawha Valley from about 100 to 200 feet, and of the Winifrede Coal—Chilton Coal interval from about 90 to 150 feet, as revealed by the correlations in the above mentioned sections, is in harmony with the general expansion of the entire Kanawha Series that takes place in the same direction. As this coal belongs about midway between the Coalburg and Chilton beds, the detailed crops of which are shown on Map II, its horizon may readily be determined at any point. No commercial mines have been opened on this vein, but it has been prospected to some extent and mined locally by farmers for domestic fuel.

The following section measured by Hennen at an opening on the north edge of the public road along Whites Trace Branch of Spruce, 0.8 mile southwest of Seng (Blair Station) is typical of the Winifrede in the Logan-Mingo area:

				Feet.	Inches.
Sandstone					
Fire clay shale				5	0
Coal, slaty	0′	2″	**Winifrede**	7	7
Sandstone, flaggy, dark	3	4			
Coal, gas	0	3			
Bone	0	2½			
Coal, gas	0	6½			
Slate, dark	0	2			
Coal, gas, hard	1	4			
Slate, gray	0	1			
Coal, splint	1	6			

Elevation of coal, 1160′ B.

The best coal is in the bottom portion of the bed. Here it belongs 140 to 150 feet above the Chilton vein which is being mined on a commercial scale so extensively along Spruce Fork and on Dingess Run in Logan County.

The thickness, character and composition of the Winifrede Coal at other prospects and exposures, along with an estimate of its minable area and tonnage by magisterial districts, will be given on subsequent pages in Chapter VIII.

The Lower Winifrede Sandstone.

The Lower Winifrede Sandstone of White,[7] belonging a few feet below the last coal described, has practically the same character in the territory of this Report as in its type locality in Kanawha County, being grayish white and brown, hard, often massive, ranging in thickness from 20 to 40 feet, and generally forming great cliffs around the hillsides. Its thickness and character are exhibited in the general sections in Chapter IV for Big Creek, Ethel, Manbar-Man, Hale, Rawl and Sprigg; for Mud Fork, Robinette and Rockhouse Fork in the special sections of the Kanawha Series in this Chapter; and in the log of Coal Test Boring No. 57, located 2.8 miles southeast of Seng. In Logan and Mingo, no marked unconformity was observed at its base as is reported in Kanawha and Fayette Counties, although there is a slight change in the lithology of the sandstone members, these having a tendency to become finer grained, more micaceous and flaggy in the lower half of the Kanawha Series, but the change is not so marked as in the latter areas.

No quarries were observed on the Lower Winifrede Sandstone in the two counties, but as with the Upper Winifrede it should crush into a sand adapted fairly well for concrete purposes in bridges along local public highways.

The Chilton "A" Coal.

In the interval separating the Winifrede and Chilton Coals in northeastern Logan County, belonging 50 to 60 feet below the former vein, there occurs a multiple bedded coal of fairly wide persistence in the territory of this Report, that has not been previously described. It is herein designated the **Chilton "A" Coal** from its association with the underlying Chilton seam, a type section of which is shown in the Clothier-Beech Creek Section, page 50. Its thickness and relative position in the rock column are further exhibited in the general sections in Chapter IV for Ethel, Breeden, Hale, Naugatuck, Sprigg, Little Coon Knob and Matewan; in the special sections of the

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[7] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

Kanawha Series on preceding pages of this Chapter for Mud Fork, Whitman, Laurel Fork, Stollings and Cub Branch; and in the logs of Coal Test Borings Nos. 53, 59, 67 and 101 on Map II. No commercial mining operations have yet been conducted on this bed, although the above mentioned sections and exposures at other points demonstrate its worth as a minable vein. Since it lies only 75 to 100 feet above the Chilton Coal, the detailed crop of which is shown on Map II, its horizon may readily be determined at any point in the area. The thickness, character and composition of this coal, along with an estimate of its minable area and tonnage by magisterial districts, are discussed in detail on subsequent pages in Chapter VIII.

The Upper Chilton Sandstone.

The Chilton Sandstone of White,[8] belonging in the Kanawha Valley in the interval separating the Chilton Coal and Lower Winifrede Sandstone, cannot be definitely correlated in the territory of this Report owing to the expansion of the measures. A great grayish brown, massive, medium grained, micaceous sandstone stratum generally occupies most of the interval between the Chilton "A" and Chilton Coals in Logan and Mingo, that has been designated herein the **Upper Chilton Sandstone** in contradistinction to the Lower Chilton ledge, lying immediately below the Chilton Coal. Its thickness and stratigraphic position are exhibited in the general sections in Chapter IV for Big Creek, Clothier-Beech Creek, Logan, Man-bar-Man, Hale, Kermit, Naugatuck, Ragland, Chattaroy, Rawl and Little 'Coon Knob; on preceding pages of this Chapter in the special sections of the Kanawha Series for Mud Fork, Laurel Fork of Pine, Buffalo Creek and Dingess Trace; and in the logs of Coal Test Borings Nos. 54, 67 and 101 on Map II. As it belongs only a few feet above the Chilton Coal, its crop should follow closely the same regions outlined for the latter vein on Map II. It generally forms prominent cliffs and steep bluffs around the hillsides. It is this stratum that makes the great cliff 75 to 80 feet high, one-fourth mile northwest of Naugatuck, about 200 feet above the Norfolk and Western

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[8] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

Railway grade, where it was once quarried quite extensively for foundation stone. This was the only quarry observed on this ledge in either county.

The Chilton "Rider" Coal.

On the waters of Beech Creek and Dingess Run, Logan County, there frequently occurs a thin coal, 20 to 40 feet above the Chilton bed, ranging in thickness from 2 inches to one foot, that has not been previously described. It is herein designated the **Chilton "Rider" Coal** from its close association over the former vein. The coal is too thin to be of economic interest, but serves as a guide in correlating the Chilton proper. Its thickness and stratigraphic position are exhibited in the Ethel Section, page 57, and in the logs of Coal Test Borings Nos. 54, 59, 61, 64 and 67 on Map II.

The Chilton Coal.

The Chilton Coal of White,[9] belonging in the Kanawha Valley 70 to 100 feet below the Winifrede vein, attains a fine development in the territory of this Report, ranking along with the Cedar Grove (Thacker) and Campbell Creek (No. 2 Gas) as the most valuable deposit of fuel in the two counties. During 1913 this seam was very carefully traced from the Hernshaw region of Kanawha County across Boone to the vicinity of Clothier in Logan County, and the fact demonstrated that it correlates with the coal that is being mined so extensively in the latter area along Spruce Fork, Dingess Run, and Rum Creek, as is revealed in the Clothier-Beech Creek Section, page 50, where it is shown to belong 408 feet above the Campbell Creek (No. 2 Gas) Coal. The latter name had heretofore been applied to the coal mined in the last mentioned localities. Although not a minable coal at its type location near Chilton in Kanawha County, yet, according to the laws of geologic nomenclature, the name "Chilton" holds by right of priority. Its thickness and relative position in the rock column are further exhibited in the general sections in Chapter IV for Ethel,

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[9] I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 430; 1908.

Manbar-Man, Dingess, Hale, Kermit, Naugatuck, Little Coon Knob, and Williamson; in this Chapter, in the special sections of the Kanawha Series for Beech Creek, Hughey, Mud Fork, Whitman, Laurel Fork of Pine, Stollings, Accoville, Robinette, Buffalo Creek and Dingess; and in Chapter VIII, in the logs of Coal Test Borings Nos. 52, 52A, 53, 54, 61, 62, 64, 67, 68, 69, 79, 93, 100 and 101 on Map II. Its crop is outlined in detail on the same map. It is the upper of the three veins that are being mined commercially on Buffalo Creek, Logan County. It it also the upper seam that is being mined by the E. R. Johnson Coal Co. on Crooked Creek, 2½ miles northward from Logan. At the present time there are no commercial mines on this coal in Mingo County, although once opened for that purpose at Naugatuck, 160 feet—aneroid measurement—above N. & W. Railway grade.

The following is a general section of the coal from the Spruce Fork region:

	Feet.	Inches.
1. Coal, semi-splint	1	6
2. Coal, gas	1	0
3. Coal, semi-splint	1	6
4. Shale, gray, 1" to	2	0
5. Coal, semi-splint	1	0
6. Coal, gas	2	0
7. Coal, semi-splint	1	0
8. Coal, gas	0	2
Total	10	2

In passing westward from the vicinity of Seng on Spruce Fork to the waters of Dingess Run at Ethel, a marked change in the lithologic structure of the portions mined takes place. Nos. 1-3 inclusive of the above section are separated from the bed operated at the Manitoba mine, ½ mile northeast of Ethel, by an interval of 20 to 25 feet, due to the expansion of the shale member—No. 4 of the above section; and the Lower Chilton Sandstone has thinned down to only 2 inches of dark, flinty fire clay with plant fossil stems, permitting the Little Chilton and the lower bench of the Chilton proper to be worked in the same mining section, the latter combination, with the exception of the Georges Creek Coal Co. (No. 44 on Map II), constituting the coal mined on Dingess Run. The following section, measured by Hennen at the mouth of the Manitoba Mine of the Logan Mining Company, ½ mile northeast of Ethel, is typical of this coal in the latter region:

					Feet.	Inches.
1.	**Coal, gas, blocky**	**0'**	**5"**	**Chilton**	**5**	**1**
2.	**Coal, semi-splint**	**2**	**5**			
3.	**Fire clay, dark, flinty**	**0**	**2**			
4.	**Coal, splint**	**0**	**8**			
5.	**Slate, black**	**0**	**1**			
6.	**Coal, splint**	**1**	**4**			

Here the upper bench of the Chilton proper belongs 20 to 30 feet higher in the measures. Passing southeastward up Dingess Run to the Georges Creek Coal Co. Mine (No. 44 on Map II), No. 3 of the above section, according to Hennen, becomes the pavement of the lower bench of the Chilton proper at this operation, and at the pit mouth the upper bench is only 15 feet higher. A short distance back in the mine, the two benches are separated by less than 2 inches of dark shale. No. 4 of the above section apparently disappears and Nos. 3 and 5 are replaced by the massive Lower Chilton Sandstone, which attains a thickness of 30 to 40 feet, 2½ miles northeastward at Seng, No. 6 becoming, at the latter place, the Little Chilton Coal.

The Chilton Coal from the Logan County mines has an excellent reputation as a steam and gas coal. Its thickness, character, composition and fuel value at these mines, as also at numerous country banks and prospect openings, are given at length in Chapter VIII, along with an estimate of the available area and tonnage by magisterial districts.

The Lower Chilton Sandstone.

A massive, bluish gray and light gray, micaceous, medium grained and arenaceous stratum, ranging in thickness from 0 to 40 feet, makes its appearance in the measures of Logan and Mingo Counties. As this sandstone has not been previously described, it is herein designated the **Lower Chilton.** Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV; the special sections of the Kanawha Series on preceding pages of this Chapter; and in the logs of Coal Test Borings Nos. 58 and 101 on Map II, published in Chapter VIII. This ledge generally forms a steep bluff around the hillsides, frequently making a marked bench in the topography upon which rests the Chilton Coal. No quarries were observed on this ledge in either county.

The Little Chilton Coal.

A thin, double bedded coal, ranging in thickness from 12 inches to 2 feet, belongs at the base of the last sandstone described, at an interval of 0 to 40 feet below the Chilton Coal. As this vein has not been previously described, it is herein designated the **Little Chilton Coal** from its close association below the Chilton bed. Its thickness and relative position in the rock column are exhibited in the general sections in Chapter IV for Ethel, Kermit, Myrtle and Chattaroy; on preceding pages of this Chapter, in the special sections of the Kanawha Series for Mud Fork and Laurel Fork of Pine; and in Chapter VIII in the logs of Coal Test Borings Nos. 54, 58, 61, 64 and 101. Its crop should follow closely the same areas as that outlined on Map II for the Chilton Coal. No commercial mines occur on this bed in either county, except when it becomes a part of the Chilton seam on Dingess Run, as described above under the account of the latter coal.

The following section, measured by Hennen on Spruce Fork, Logan County, 250 yards north of the mouth of Beech Creek, is typical of this coal in the territory of this Report:

					Feet.	Inches.
1.	Sandstone, massive, visible				15	0
2.	Coal, gas	1'	3"	Little Chilton	2	0
3.	Slate, gray	0	2			
4.	Coal, splint	0	7			

Elevation of coal, 860' B.

The following section is reported by Hennen at the crop of the Little Chilton Coal along the railroad grade, on the east bank of Spruce Fork, ¾ mile south of the mouth of Seng Camp Creek:

				Feet.	Inches.
Sandstone, bluish gray, visible				10	0
Coal, gas	0'	5½"	Little Chilton	1	4
Shale, gray	0	1½			
Coal, gas	0	9			
Fire clay shale					

Elevation of coal, 925' B.

On Spruce Fork at Seng, the following section is exposed, according to Hennen, along the crop of this vein near the northwest edge of the town:

	Feet.	Inches.
Coal, Chilton	6	0
Fire clay shale	7	0
Sandstone, massive, bluish gray, micaceous, many fossil tree stems, forming cliff, Lower Chilton	25	0
Shale, buff, with iron ore nodules, 2' to	3	0
Coal, Little Chilton	0	6
Fire clay shale to railroad grade	2	0
Sandstone, massive	6	0

Farther up Spruce Fork, the following section was measured by Hennen at its crop along railway grade just southwest of Coal Test Boring No. 56 on Map II, 0.2 mile below the mouth of Brushy Fork:

	Ft.	In.		Feet.	Inches.
Sandstone, massive, fine grained, micaceous, yellowish gray				10	0
Coal	0'	7"	Little Chilton..	0	9
Bone	0	2			
Sandstone, shaly, and shale, sandy				25	0
Bone	0'	2 "	Hernshaw	2	0
Coal, gas	0	10			
Slate, black	0	0½			
Coal	0	11½			
Fire clay				2	0
Sandstone to railway grade				1	0

Elevation of Little Chilton Coal, 1160' B.

In the southwestern edge of Logan District, the following section was measured by Reger on a small branch of Pine Creek, 0.2 mile south of Coal Test Boring No. 98 on Map II, at what appears to be an exposure of the Little Chilton Coal:

	Ft.	In.		Feet.	Inches.
Sandstone, massive				35	0
Coal, Chilton "Rider"				..	..
Shale, gray				2	0
Sandstone, massive				30	0
Coal, Chilton				2	6
Shale				..	..
Shale, gray	1'	1"	Little Chilton (1015' B.)	3	6
Shale, gray	1	4			
Coal	1	1			
Shale and concealed					

In Harvey District, Mingo County, an opening in the Little Chilton Coal was observed by Reger on Hickory Branch, 1¼ miles northwest of Breeden, at an elevation of 870′ B. This digging had fallen shut, but the coal is reported 18 inches thick by Richard D. Kirk.

In Warfield District, the crop of this coal was observed at several points, the following section being measured by Reger at what appears from the interval to be an exposure of this bed on the head of Jennie Creek, 0.6 mile northwest of "Swelled Hickory Gap:"

			Feet.	Inches.
Shale, sandy			5	0
Sandstone, massive			2	0
Shale, gray			2	0
Coal, slaty	1′ 0″			
Shale, gray	1 0			
Coal, splint	3 0	Little Chilton	5	0
Concealed and dark shale to run			7	0

Elevation of coal, 895′ B.

The correlation is based on the fact that it belongs 135 feet below an opening in the Chilton "A" bed, ½ mile eastward, according to Reger, and if correct this exposure represents the maximum thickness observed for the bed in the territory of this Report. Two and a half miles southeastward in the same district, the following section was measured by Reger at an exposure of the Little Chilton on the east bank of Marrowbone Creek, 0.3 mile south of the mouth of Messer Branch at the sulphur spring:

	Feet.	Inches.
Sandstone, massive		
Coal, Little Chilton	2	0
Sandstone, massive. containing sulphur spring		

Elevation of coal, 770′ B.

Near the southern edge of the same district, the following section is reported by Reger at the crop of this coal one-eighth mile below the forks of Upper Burning Creek and 2.1 miles southeast of Kermit:

			Feet	Inches.
Sandstone, massive				
Shale, gray			1	0
Coal	0′ 10″			
Shale, gray	0 0½			
Coal	0 5½	Little Chilton	1	4
Shale			1	0
Sandstone, massive, to creek			12	0

Elevation of coal, 675′ B.

In Hardee District, the crop of the Little Chilton Coal was noted at several points, the following section being obtained by Reger at the **Arminda Sheppard Opening,** in the northeast corner of the district, on the head of Trace Fork of Pigeon:

			Feet.	Inches.
Shale, sandy				
Coal, soft	0′ 4″			
Slate, bony	0 4			
Coal, splint	1 9	Little Chilton	2	5
Fire clay				

Elevation of coal, 1025′ B.

Three-fourths mile northwestward on Dingess Camp Branch of Trace, Reger reports the same coal only 14 inches thick at an exposure at an elevation of 1035′ B.

About 2½ miles westward in the bed of Left Fork of Riffe Branch in the same district, this coal is reported 12 inches thick by Reger, at an elevation of 885′ B.

In a ravine on the south side of Right Fork of Laurel, ¾ mile southeast of Rapp, in the same district, Reger reports the following section at an exposure of this seam:

			Feet.	Inches.
Sandstone, massive				
Shale			3	0
Coal	1′ 0″			
Shale, gray	0 2			
Coal	0 3			
Shale, dark	0 3			
Coal, splint	1 2	Little Chilton	2	10
Fire clay				

Elevation of coal, 785′ B.

In the southern portion of Hardee District, Reger measured the following section at the crop of this coal on the south side of Road Branch, 2 miles due east of Maher on the N. & W. Railway:

			Feet.	Inches.
Sandstone, shaly				
Shale			1	0
Coal	1′ 1″			
Slate, black, soft	0 3			
Coal, splint	0 10	Little Chilton	2	2
Fire clay				

Elevation of coal, 830′ B.

In Lee District, the Little Chilton Coal is thin and unimportant, as revealed in the few exposures noted. The following section was measured by Gawthrop at an old digging in this vein on the east side of the hill road near the head of Rockhouse Fork, 2¾ miles northeast of Varney:

	Feet.	Inches.
Sandstone, massive, Lower Chilton		
Coal, cannel, Little Chilton	0	6
Concealed	15	0
Shale, dark, sandy	5	0

Elevation of coal, 1235′ B.

One mile and a half southwestward on Spring Branch of Rockhouse, Gawthrop measured the following section at the crop of this coal in the bed of the stream:

	Feet.	Inches.
Sandstone, shaly	5	0
Coal, Little Chilton	0	7
Shale, dark, silicious, bed of branch		

Elevation of coal, 1265′ B.

The foregoing data on the Little Chilton Coal show that it is too thin, irregular and slaty to be classed as a minable bed, except when it unites with the Chilton, as it does on Dingess Run, Logan County, a feature that has been discussed on preceding pages of this Report.

The Hernshaw Sandstone.

In the interval separating the Little Chilton Coal and the Hernshaw Coal next below in the territory of this Report, a massive, medium grained, micaceous and grayish brown sandstone, ranging in thickness from 20 to 50 feet, frequently makes its appearance. This stratum has not been previously described and it is herein designated the **Hernshaw Sandstone** from its association with the underlying coal. Its thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Logan-Lincoln-Mingo Corner, Big Creek, Breeden, Kermit, Naugatuck, Ragland, Chattaroy and Little Coon Knob; in the special sections of the Kanawha Series on preceding pages of this Chapter for Chapman Branch and Laurel Fork of Pine; and in the logs of Coal Test Borings Nos. 51, 54, 58, 64, 79, 101 and 102.

Only one quarry was observed on this ledge; viz, at the mouth of Parsley Big Branch in the southern point of Warfield District. (See section on subsequent page under the description of the Naugatuck Sandstone).

The Hernshaw Coal.

On Lens Creek, Kanawha County, a coal has long been mined about 120 feet above the Cedar Grove Coal, near Hernshaw, that has heretofore been correlated with the Winifrede, though locally known as the "Black Band" seam. The Hernshaw Section, page 44, shows this bed about 120 feet above the Cedar Grove and 175 feet below the true Winifrede; hence, this vein has not heretofore been named. As it has a wide distribution in the territory of this Report, it is herein designated the **Hernshaw Coal** from the town near which it is commercially mined in Kanawha County. The following section, measured at the entrance of the Black Band No. 1 Mine of the Marmet Coal Co. in the latter region, is typical of this bed:

					Feet.	Inches.
1.	Shale, bluish gray, sandy, with plant fossils.					
2.	Shale, gray, with thin coal streaks	0′	3 ″	Hernshaw Coal..	3	11½
3.	Coal, gas, bright	0	6½			
4.	Shale, gray, with thin coal streaks	0	0¾			
5.	Coal, splint, hard	2	1¼			
6.	Slate, gray, 0″ to	0	1			
7.	Coal, gas........	0	11			
8.	Slate, gray and hard......................					

Parting No. 4 is persistent in the mine, but No. 6 is irregular.

In Logan and Mingo Counties, the thickness, character and relative position in the rock column of the Hernshaw Coal are exhibited in the general sections in Chapter IV for the Logan-Lincoln-Mingo Corner, Clothier-Beech Creek, Dingess, Kermit, Naugatuck and Chattaroy; in the special sections of the Kanawha Series on preceding pages of this Chapter for Chapman Branch and Laurel Fork of Pine; and in the logs of Coal Test Borings Nos. 51, 54, 58, 64, 79, 101 and 102 on Map II. It is readily seen that it is a multiple bed, being too thin, irregular and slaty to be classed as a minable coal. The position of its crop may be determined at any point, as it belongs only 50 to 100 feet above the **Dingess Limestone,** the detailed crop of which is exhibited on Map II. There are no commercial mines on this seam in either county, but a fair idea of its character may be obtained from several sections that will now be given, which were measured at prospects and other exposures:

In the eastern point of Chapmanville District, the following section was obtained by Hennen at an opening in the Hernshaw Coal along the edge of the road on the head of Garrett Fork of Big Creek, at an elevation of 1430′ B.:

			Feet.	Inches.
Sandstone, massive, Hernshaw..................			6	0
Coal, gas...............	0′ 8″			
Slate, black............	0 6			
Coal, semi-splint........	2 3	Hernshaw	3	5
Fire clay				

In the northwestern edge of the same district, the following section was obtained by Reger at the **Marion Farmer Opening,** located just across the line in the edge of Lincoln County, one mile southwest of Fry, at an elevation of 755′ B.:

			Feet.	Inches.
Sandstone, massive, Hernshaw..................				
Coal, soft...........	0′ 10 ″			
Slate, black, 1″ to..	0 0½			
Coal, medium hard..	1 3	Hernshaw	2	1½
Shale, gray....................................				

In the north edge of Logan District, this coal was once exposed in a slip on the north side of Hewett Creek, 0.4 mile northeast of Lake, at an elevation of 1315′ B., according to E. R. Covey, who reports the same 6 feet in thickness. In 1913 it was concealed by debris when visited by Hennen.

In the northeastern edge of the same district, the following was obtained by Hennen at an exposure of this coal along a railroad cut, 0.4 mile northwest of Clothier:

			Feet.	Inches.
Sandstone, buff, fine grained, Hernshaw			25	0
Coal	1′ 0″			
Fire clay	0 6			
Coal	0 4	Hernshaw	1	10
Sandstone				

Elevation of coal, 1000′ B.

In the eastern portion of the same district, the following section was measured by Hennen along the railroad grade on the south side of Spruce Fork, one-eighth mile below the mouth of Brushy Fork:

			Feet.	Inches.
Sandstone, massive, fine grained, micaceous, yellowish gray			10	0
Coal	0′ 7″			
Bone	0 2	Little Chilton	0	9
Slate, shaly, and shale, sandy			21	0
Bone	0′ 2 ″			
Coal, gas	0 10			
Slate, black	0 0½			
Coal	0 11½	Hernshaw Coal	2	0
Fire clay			2	0
Sandstone, to railroad grade			1	0

Elevation of Hernshaw Coal, 1135′ B.

The above exposure is just a few feet southeast from Coal Test Boring No. 56 on Map II.

In the south central portion of the same district, the following was obtained by Hennen at an opening on Beech Branch, 1 mile west of Rolfe:

			Feet.	Inches.
Sandstone, massive, Hernshaw			10	0
Shale, sandy			1	0
Coal, gas	0' 6 "			
Slate, gray	0 0¼			
Coal, gas	0 8			
Slate, gray	0 2			
Coal, splint	1 1¾	**Hernshaw**	2	6
Fire clay				

Elevation of coal, 905' B.

In the southwestern portion of Logan District, Reger obtained the following section at an exposure on the north edge of Pine Creek, 0.1 mile north of Coal Test Boring No. 99 on Map II:

			Feet.	Inches.
Sandstone, massive				
Shale, gray			1	0
Coal	0' 5"			
Shale, gray	1 0			
Coal	1 8	**Hernshaw Coal**	3	1
Shale, gray, to Pine Creek			2	0

Elevation of coal, 1000' B.

In the eastern point of Triadelphia District, this bed crops in the bed of Buffalo Creek, 5½ miles due east of Craneco, at an elevation of 1855' L., where the following section was measured by Hennen:

	Feet.	Inches.
Soil and debris	5	0
Coal, splint, Hernshaw	3	10
Shale		

In **Mingo County**, the Hernshaw Coal has practically the same development as in Logan. In Harvey District, the following section was measured by Reger at an exposure on Barker Branch of East Fork of Twelvepole at the bend of the public road, 2 miles S. 10° E. of McCloud:

			Feet.	Inches.
Sandstone, massive, visible			20	0
Shale			0	6
Coal	0' 8"			
Shale	0 2			
Coal	0 6	**Hernshaw**	1	4
Concealed				

Elevation of coal, 985' B.

The coal has been mined here by stripping, the base of the seam being concealed so that the entire thickness was not obtained.

Near the center of the same district, Reger obtained the following in the north edge of Moses Fork, 2 miles east of Dingess:

			Feet.	Inches.
Shale, sandy			5	0
Coal	0' 5"			
Slate, gray	0 2			
Coal	0 1			
Shale, gray, with iron iron ore nodules	0 10			
Coal, hard	0 4	Hernshaw	1	10
Fire clay				
Elevation of coal, 1175' B				

In the southwest edge of Harvey District, the following section was measured at the crop of this coal in a Norfolk & Western Railway cut, 700 feet west of Hale, at an elevation of 885' B.:

			Feet.	Inches.
Sandstone, massive, Hernshaw			20	0
Shale, gray			0	4
Coal	1' 0"			
Coal, slaty	1 6			
Shale, gray	2 0	Hernshaw	5	0
Coal	0 6			
Sandstone, massive			3	0
Fire clay shale to railway grade			5	0

In the same district, Reger reports 12 inches of this vein visible at its crop in the road, 0.3 mile northwest of the common corner of Chapmanville, Harvey and Logan Districts, at an elevation of 1015' B.

In the western portion of the same district, the following was obtained by Reger at an opening in the Hernshaw Coal on the West Fork of Twelvepole, 0.8 mile east of Kirk, at an elevation of 960' B.:

		Feet.	Inches.
Sandstone, massive, Hernshaw			
Shale, gray		0	6
Coal, soft	1' 5"		
Slate, black, bony	0 10		

			Feet.	Inches.
Coal, splint	1' 0"	Hernshaw	3	3
Fire clay and concealed			5	0
Sandstone, massive			5	0
Coal			0	8
Fire clay				

In the southwestern edge of Warfield District, the following section was measured by Hennen at the crop of this bed at the east portal of the Norfolk & Western Railway tunnel, 3 miles northwest of Naugatuck:

			Feet.	Inches.
Shale, sandy				
Sandstone, ferriferous			1	0
Slate, black			3	0
Coal	0' 3"			
Shale	3 0			
Coal	0 7	Hernshaw	3	10
Shale, gray			10	0
Sandstone, massive, Naugatuck, to railroad grade			20	0

Elevation of coal, 670' B.

In the western portion of the same district, Reger measured the following at an exposure of this coal on Stonecoal Branch, 3¼ miles N. 10° E. of Kermit, at an elevation of 855' B.:

	Feet.	Inches.
Sandstone, shaly		
Coal, Hernshaw	1	3
Fire clay		

In Hardee District, the following section was obtained by Reger at an exposure of this coal on Dingess Camp Branch of Trace, 0.9 mile southwest of the common corner of Harvey, Logan and Hardee Districts, at an elevation of 980' B.:

			Feet.	Inches.
Shale, sandy				
Coal	0' 6"			
Slate, black, with coal streaks	1 0			
Shale, gray	0 10			
Coal	0 2	Hernshaw	2	6
Sandstone, massive			30	0

In the same district, Reger obtained another section of this vein at a digging on the north side of Trace Fork of Pigeon, 1.2 miles N. 70° E. of the mouth of the former, at an elevation of 800′ B.:

				Feet.	Inches
Sandstone, massive					
Coal	0′	1″			
Shale, gray	0	4			
Coal	0	6			
Shale, gray	0	4			
Coal	0	8			
Shale	1	8			
Coal	0	6	Hernshaw	2	6
Concealed					

In the same district, Hennen obtained the following section at an opening in this bed, ¼ mile northwest of Rapp, at an elevation of 745′ B.:

				Feet.	Inches.
Shale, sandy				5	0
Coal, gas, hard	0′	8″			
Slate, black	0	1			
Coal, splint	0	4			
Slate, gray	0	5			
Coal, splint	0	8			
Slate, black	0	1	Hernshaw	2	6
Coal	0	3			

In the southern edge of Hardee District, Gawthrop obtained the following section at the crop of this coal on Mill Fork of Miller Creek, 2 miles N. 10° E. of Chattaroy, at an elevation of 915′ B.:

				Feet.	Inches.
Sandstone, Hernshaw					
Coal, hard	0′	3″			
Coal, cannel	0	3			
Coal, hard	0	6			
Shale and coal	4	0			
Coal, visible	1	0	Hernshaw	6	0
Concealed					

Only one section of the Hernshaw Coal was obtained in Lee District. This is reported as follows by Gawthrop from an exposure on Right Fork of Elk Creek, 1 mile north of Ragland, at an elevation of 1030′ B.:

			Feet.	Inches.
Shale, sandy			5	0
Coal, gas	0' 10"			
Shale, gray	2 6			
Coal, cannel	0 4			
Coal, hard	0 4	Hernshaw	4	0
Shale				

The Hernshaw Coal maintains its multiple bedded character in Magnoiia District, as is revealed in the following section measured by Gawthrop on Nighway Branch of Pigeon Creek, 1.4 miles northwest of Calico, at an elevation of 1400' B.:

			Feet.	Inches.
Sandstone, massive			8	0
Coal, gas	0' 8"			
Shale, gray	2 0			
Coal, gas	1 8	Hernshaw	4	4
Shale				

No exposures or openings were observed on the Hernshaw Coal in Stafford District, but it should occur high up in the hills along the western and northern boundary lines.

The foregoing data on this bed show it too irregular, slaty and impure to be classed as a minable coal, although some localities should furnish a fair grade of fuel, especially in the eastern point of Triadelphia District on the headwaters of Buffalo Creek.

The Naugatuck Sandstone.

At Naugatuck, Mingo County, there occurs a great massive, grayish white, medium grained sandstone, ranging in thickness from 30 to 40 feet, where it forms a prominent cliff 30 to 40 feet above the N. & W. Railway grade. This stratum belongs in the interval separating the Hernshaw Coal and the next vein below—the Dingess Coal—and, as it has not been previously described, it is herein designated the **Naugatuck Sandstone.** Its thickness and relative position in the rock column are exhibited in the general sections in Chapter IV for Naugatuck, Dingess, Ragland, Chattaroy, Rawl and Clothier;

and in the Chapman Branch Section on preceding pages of this Chapter.

Only one small quarry was noted on this ledge in the territory of this Report; viz, at the mouth of Parsley Big Branch in the southern point of Warfield District, where the following section was obtained by Hennen and Reger:

			Feet.	Inches.
Sandstone, massive, quarry rock, Hernshaw			30	0
Shale			3	0
Sandstone, nodular, ferriferous, fossil worm?			3	0
Coal	0′ 3″			
Shale, gray	1 8			
Coal	0 10½			
Coal, bony	0 2			
Coal	0 3½	Hernshaw Coal	3	3
Shale, gray			1	0
Sandstone, massive, quarried here, Naugatuck			20	0

Elevation of base of Naugatuck quarry, 630′ B.

The Dingess Coal.

At Dingess, Mingo County, a coal was once mined extensively on a commercial scale, at an elevation of 1015′ B., and the same correlated with the Campbell Creek (No. 2 Gas) bed on page 583 of Volume II of the State Geological Reports, and later with the Alma Coal of the Tug River region, on pages 406-407 of Volume II(A) of the same Reports. The investigations by the authors during the field season of 1913 demonstrated the fact that it represents a separate and distinct coal that has not been previously named. It is herein designated the **Dingess Coal**. Its stratigraphic position and thickness are exhibited in the general sections in Chapter IV for Dingess, Breeden, Hale, Naugatuck and Chattaroy; in the special sections of the Kanawha Series, on preceding pages of this Chapter for Dingess Trace Branch, Marrowbone and Browning Fork; and in the logs of Coal Test Borings Nos. 79 and 102. The following section, measured in the old abandoned mine of the Pearl Coal Mining Company at Dingess, is typical of this bed in Logan and Mingo:

			Feet.	Inches.
Coal, gas	1′ 3½″			
Bone	0 1½			
Coal, splinty	1 8	Dingess Coal	3	1

As the coal belongs only 20 to 30 feet above the well determined **Dingess Limestone,** its position at any point in the area may be readily ascertained, since the detailed crop of the latter formation is outlined on Map II. It attains its best development in Chapmanville and Harvey Districts. At present there are no commercial mines on this coal in the two counties, but its thickness, character and chemical composition at country banks, prospects and crop exposures are given in detail in Chapter VIII.

The Williamson Sandstone.

In the interval separating the Dingess and Williamson Coals, there generally occurs a massive, medium grained, dull gray and micaceous sandstone, from a few inches to 10 feet above the marine fossiliferous **Dingess Limestone,** ranging in thickness from 5 to 25 feet. As this stratum has not been previously described, it is herein designated the **Williamson Sandstone.** Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV for Clothier, Dingess, Kermit, Ragland, Chattaroy, Rawl and Matewan; in the special sections of the Kanawha Series on preceding pages of this Chapter, for Chapman Branch, Stone Branch and Whitman; and in the logs of Coal Test Borings Nos. 26, 55, 64, 98 and 101. No quarries were observed on this ledge in either county.

The Dingess Limestone.

At 20 to 30 feet below the last formation described, there occurs a marine fossiliferous limestone at Dingess, Mingo County, which is gray and hard, frequently brown and silicious, lenticular and ferriferous, ranging in thickness from 0 to 5 feet. It was first discovered by Reger in the bed of Twelvepole Creek, 1 mile southeast of Dingess, where marine fossils occur in profusion, and later traced, as mentioned at the beginning of Chapter IV, by Hennen, Krebs and Reger, from Winifrede Junction in Kanawha County, where marine fossils are numerous, southwestward across Kanawha and Boone to the Logan County Line, and thence by the authors southwestward across the territory of this Report, via Dingess to Naugatuck, and along Tug Fork southeastward from the Wayne-Mingo Line to near Auburn, 1 mile above Matewan. Its detailed crop is outlined by appropriate symbol on Map II. As this stratum has not been previously described, it is herein designated the **Dingess Limestone** from the town near which it was first observed. Marine fossils of the genera Productus (abundant), Derbya, Spirifer, Composita?, Orbiculoidea, and Lingula, of the Brachiopoda; and Myalina, Leda, Nucula, and Allorisma, of the Pelecypoda, abound, according to W. Armstrong Price, Paleontologist of the Survey. He also reports a fish tooth from a collection at Williamson.

In thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Breeden, Dingess, Hale, Kermit, Myrtle, Chattaroy, Rawl and Matewan; in the special sections on preceding pages of this Chapter for Ramage, Holden, Zinn Branch and Marrowbone; and in the log of Coal Test Boring No. 99. This stratum aided very materially in straightening out the correlation tangle of the members of the Kanawha Series in Boone, Logan and Mingo Counties, its position in the measures of Kanawha County being shown in the Hernshaw Section, page 44. It is frequently replaced by a thin ferriferous sandstone in which is very distinctly preserved the same fossil fauna. This happens along the Norfolk & Western Railway southeastward from Naugatuck at the mouth of Old House Branch and southeast to the mouth of Road Branch. In Chapter VIII under the detailed sections given for openings and exposures of the Dingess and Williamson Coals, the Dingess Limestone is frequently noted, to which the reader is referred if fossils from the same are desired.

The limestone is too thin, irregular and impure to have any economic value, only to add to the fertility of the soil in the immediate region of its crop.

The Williamson Coal.

Immediately underlying the last formation described, there occurs a multiple bedded coal that has long been mined commercially at Williamson on Williamson Creek at Mines Nos.

66 and 67 on Map II. This bed was erroneously correlated with the Thacker (Cedar Grove) Coal on pages 411 and 412 of Volume II(A) of the State Survey Reports, as will readily appear from an examination of the Williamson, Rawl and Matewan Section, page 83, 77 and 85, respectively, of this Volume, the true Thacker or Cedar Grove Coal belonging 75 to 90 feet lower down in the measures. The following section, measured by Hennen at Mine No. 2 of the Williamson Coal & Coke Co. (No. 67 on Map II), is typical of this bed in the territory of this Report:

				Feet.	Inches.
Coal, semi-splint........	0'	5"			
Slate, gray, 0" to.......	0	1			
Coal, semi-splint........	0	4			
Slate, gray.............	0	3			
Coal, semi-splint........	2	6			
Slate, gray, 0" to.......	0	3			
Coal, semi-splint, 9" to..	0	10	Williamson	4	8

The thickness, character and stratigraphic position of this coal are exhibited in the general sections in Chapter IV for Big Creek, Clothier-Beech Creek, Kermit, Naugatuck, Myrtle, Ragland, Chattaroy, Rawl, Sprigg, Little Coon Knob, Williamson, Matewan and Cedar; in the special sections of the Kanawha Series on preceding pages of this Chapter for Chapman Branch, Stone Branch, Ramage, Holden, Whitman, Zinn Branch, Laurel Fork of Pine, Robinette, Dingess Trace Branch, Marrowbone and Hatfield; and in the logs of Coal Test Borings Nos. 25, 26, 50, 51, 55, 58, 64, 77, 98, 99 and 101.

This coal is present in the measures of Kanawha County, only 40 feet above the Cedar Grove bed, as shown in the Hernshaw Section, page 44. From the latter region, it was carefully traced during 1913 along with other members of the Kanawha Series, as mentioned above under the description of the **Dingess Limestone,** southwestward across Kanawha and Boone to the Logan County Line, and thence on across Logan and Mingo to Tug Fork. Since it belongs so close to the **Dingess Limestone,** the position of its crop may readily be determined at any point in the area, as that for the latter member is given in detail on Map II. As this seam represents a separate and distinct bed from the Thacker (Cedar Grove), it is herein designated the **Williamson Coal** from the place where it was first successfully mined.

The coal attains its best development in the southeast portions of the two counties as exhibited in Figure 13 on a subsequent page. There are no commercial mines on this seam in Logan, but in Mingo it is mined both at Hatfield and Williamson. It is this bed that was once mined commercially on Coleman Branch, ½ mile northeast of Nolan, but had been abandoned when visited by Hennen in 1913. One mile southward from Matewan, this vein is mined at the upper opening of the Pike Collieries Co. near Auburn on the Kentucky side of Tug—88 feet by hand-level above the Cedar Grove (Upper Thacker), also operated. Here, as at Matewan and Williamson, the overlying **Dingess Limestone** has been replaced by sandy and limy shales with iron ore nodules, but it holds numerous marine fossils.

The character and composition of the Williamson Coal, along with many sections measured at exposures, prospects, country banks and commercial mines, are given in detail on subsequent pages in Chapter VIII, as also an estimate of the minable area and tonnage by magisterial districts.

The fossiliferous **Seth Limestone** of Krebs,[12] belonging at its type locality near Seth in Boone County 15 to 20 feet below the Williamson Coal, 35 to 50 feet below the fossiliferous Dingess Limestone and 180 feet above the base of the lower bench of the Campbell Creek (No. 2 Gas) Coal, was not observed in the territory of this Report. As this limestone belongs in the interval separating the Williamson and Cedar Grove Coals, it has evidently been replaced in Logan and Mingo by the development of the Upper Cedar Grove Sandstone. This marine fossiliferous horizon was not discovered until 1914, many months after the completion of the field work in these two counties; hence, it is possible that future search may reveal its presence therein.

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[12] C. E. Krebs, Boone County Report, W. Va. Geol. Survey; 1914.

The Upper Cedar Grove Sandstone.

At 5 to 20 feet below the last coal described and 15 to 30 feet above the Cedar Grove Coal, there occurs a massive, grayish brown, micaceous and medium grained sandstone in the territory of this Report, ranging in thickness from 20 to 40 feet, that has not been previously described. It is herein designated the **Upper Cedar Grove Sandstone** from its association with the underlying coal. Its thickness and character are exhibited in the general sections in Chapter IV for Clothier-Beech Creek, Logan, Oilville, Manbar-Man, Dingess, Naugatuck, Myrtle, Ragland, Rawl, Sprigg, Little Coon Knob, Matewan and War Eagle; in the special sections of the Kanawha Series on preceding pages of this Chapter for Holden, Zinn Branch, Laurel Fork of Pine, Rum Creek, Sherman, Robinette, Marrowbone and Maritime; and in the logs of Coal Test Borings Nos. 56, 64, 71, 98, 99 and 101. Along Tug Fork in Mingo, it is a very prominent cliff maker and generally forms a marked bench around the hillsides in the region of its crop, upon which rests the Williamson Coal.

In Logan District, Logan County, it is this stratum that is quarried for building purposes 0.2 mile southwest of Holden on the west bank of Trace Fork, where Reger reports it gray, hard, micaceous and massive. The quarry face is about 200 feet long and has been driven about 30 feet into the hill.

Reger reports another quarry on this ledge along the south bank of Copperas Mine Fork, 0.3 mile east of Holden, where he measured the following section:

	Feet.	Inches.
Coal, Williamson	2	6
Fire clay	1	6
Sandstone, shaly	8	6
Sandstone, massive, medium fine, micaceous, gray, Upper Cedar Grove	25	0
Concealed	5	0
Shale, silicious	46	0
Coal, Cedar Grove ("Island Creek")	4	0

Stone from this quarry was used in building the company store at Holden.

One mile west of Holden, opposite the mouth of Curry Branch, Reger measured the following section at an extensive quarry on the Upper Cedar Grove ledge:

	Feet.	Inches.
Coal, Williamson (850′ B.)......................	1	6
Sandstone, massive, Upper Cedar Grove.........	50	0
Concealed, to bed of Copperas Mine Fork.......	15	0

Here the sandstone has been quarried quite extensively for building purposes, the quarry being about 300 feet long and at the deepest point reaches back into the hill about 50 feet. The physical structure of the stone, according to Reger, is variable. In some parts of the quarry it is massive, making it possible to split out blocks of considerable size. In other parts, bedding planes are numerous. There are frequent streaks of gray slate and cross-bedding is general. Ripple marks are visible in the upper portion. The sandstone is gray, very hard, micaceous and medium fine grained, changing to brown on exposure. The stone used in the construction of the store, power house and hospital at Holden came from the Upper Cedar Grove ledge.

In Hardee District, Mingo County, Reger reports the Upper Cedar Grove Sandstone cropping along the north bank of Trace Fork of Pigeon, 1 mile northeast of Myrtle, at an elevation of 695′ B., in a great cliff 50 feet in height.

Along Tug Fork in Mingo, this ledge should furnish an inexhaustible supply of building stone from the long line of cliffs exposed.

The Cedar Grove ("Thacker") Coal.

The Cedar Grove Coal of White,[10] belonging at its type locality in Kanawha County about 300 feet below the Winifrede Coal, 100 to 120 feet above the Campbell Creek or No. 2 Gas bed, attains a fine development and has a wide distribution in the territory of this Report, ranking next to the Campbell Creek (No. 2 Gas) as the most valuable deposit of coal in the two counties. As mentioned in the beginning of Chapter IV and under the description of the **Dingess Limestone** in this Chapter, the Cedar Grove Coal, along with other members of the Kanawha Series, was carefully traced during 1913 from the Kanawha River region southwestward across Kanawha, Boone,

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[10] I. C. White, Bull. 65, U. S. Geol. Survey, pp. 138-140; 1891; and Vol. II, W. Va. Geol. Survey, p. 562; 1903.

Logan and Mingo Counties and proved to be without doubt the same as the "Island Creek" Coal of the Holden Section of Logan County and the "Red Jacket," "Thacker" and "Upper Thacker" seam of the Matewan region of Mingo. Its thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Hernshaw, Clothier-Beech Creek, Oilville, Manbar-Man, Dingess, Naugatuck, Myrtle, Ragland, Rawl, Sprigg, Little Coon Knob, Matewan and War Eagle; in the special sections of the Kanawha Series in this Chapter for Ramage, Mud Fork, Holden, Zinn Branch, Laurel Fork of Pine, Stollings, Rum Creek, Sherman, Robinette, Buffalo Creek, Marrowbone, Maritime, Grapevine Mine and Browning Fork; and in the logs of Coal Test Borings Nos. 25, 26, 49, 50, 51, 54-56, 58, 64, 69, 70, 71, 77-79, and 93-101. These sections show that in Logan and Mingo the Cedar Grove Coal belongs about mid-way between the Chilton and Campbell Creek (No. 2 Gas) Coals, 50 to 100 feet below the Williamson Coal, and 30 to 60 feet above the Alma vein.

The coal is nearly always multiple bedded, containing gas and splint coals in about equal proportion. The following is a typical section of this vein in the vicinity of Holden, Logan County, where it is locally known as the "Island Creek" Coal:

			Feet.	Inches.
1.	Coal, gas, 6" to	1' 3"		
2.	Coal, splint, 15" to	1 6		
3.	Shale, gray, hard, 1" to	0 6		
4.	Coal, splint, 18" to	2 0		
5.	Coal, gas, 18" to	2 0	7	3

In Logan County, it is this bed that is mined commercially on such an extensive scale along the waters of Island Creek above Logan, where it was erroneously correlated on pages 383-386 of Volume II(A) of the State Survey Reports with the No. 2 Gas bed of the Kanawha Valley. In the same county, it is also mined extensively for shipment as steam and domestic fuel on Buffalo Creek, where it is the middle seam of the three now being operated. In this region, apparently only the upper bench, or Nos. 1 and 2 of the above section, has been opened, the parting shale—No. 3—of the above type section having so expanded in the southeastern portions of both Logan and Mingo as to render Nos. 4 and 5 a separate and distinct seam; viz, the **Lower Cedar Grove Coal.** The latter, as well as the intervening sandstone—Middle Cedar Grove—are described below under separate headings.

In Mingo County, the Cedar Grove is mined commercially at Matewan and on the waters of Mate, Sulphur, Thacker and Grapevine Creeks, where it has an excellent reputation as a steam and domestic fuel and is locally known as the "Thacker," "Upper Thacker" and "Red Jacket."

A thin, double bedded, "rider" coal, ranging in thickness from 12 to 18 inches, nearly always accompanies the Cedar Grove Coal in Logan and Mingo at 10 to 20 feet above the latter, a feature that is typical of the last mentioned coal in the Kanawha Valley. Its intervening and overlying shales generally carry numerous plant fossils. Although not given a place in the General Section of the Kanawha Series, page 101, it was generally referred to in the field as the **Cedar Grove "Rider" Coal.** It is too thin to be of commercial importance, but serves as an additional guide in the correlation of the main Cedar Grove bed. In Logan County the Cedar Grove ("Island Creek" Coal has the same tendency to develop local deposits of cannel coal on the waters of Island Creek as it does in the Peytona region of Boone County.

The detailed crop of the Cedar Grove Coal is shown by appropriate symbol on Map II. The region of its best development is exhibited in Figure 14, Chapter VIII. Its thickness, character, composition and fuel value at the numerous commercial mines, prospect openings, country banks and crop exposures are given in detail in the same Chapter, along with an estimate by magisterial districts of its minable area and tonnage.

The Middle Cedar Grove Sandstone.

In the southeastern portions of Logan and Mingo Counties, the parting shale—No. 3 of the foregoing type section of the Cedar Grove Coal—is replaced by a massive, gray, fine grained and micaceous sandstone, ranging in thickness from 0 to 60 feet and sometimes holding a thin coal. As this stratum has not been previously described, it is herein designated the

Middle Cedar Grove Sandstone from its association with the coal and in contradistinction from the Upper and Lower Cedar Grove ledges. Its thickness, character and stratigraphic position in the measures are exhibited in the general sections in Chapter IV for Clothier-Beech Creek, Manbar-Man, Naugatuck, Chattaroy, Rawl and Cedar; in the special sections of the Kanawha Series on preceding pages of this Chapter for Stollings, Rum Creek, Maritime, Rose Siding, Thacker and Grapevine; and in the logs of Coal Test Borings Nos. 25, 26, 55, 69, 70, 71, 72, 78, 86, 88 and 89.

The western boundary line where it disappears corresponds closely to the same boundary of the Lower Cedar Grove Coal as outlined in Figure 15 in Chapter VIII. In Logan District, Logan County, the development of this sandstone is readily traced from an old opening in the Cedar Grove Coal at the Draper Mine (No. 125 on Map II) in the Alma Coal, in the northeast edge of Logan, southeastward up the Guyandot River.

The following section was measured by Hennen at its crop on the north bank of Guyandot River, 1.2 miles southeast of Stollings:

	Feet.	Inches.
Coal, Cedar Grove, with partings...............	9	9
Shale, sandy...............................	2	0
Sandstone, massive, fine grained, Middle Cedar Grove	22	0
Coal, splint.............1′ 8″ } Lower Cedar Coal, gas...............1 4 } Grove	3	0
Shale, sandy..................................	2	0
Sandstone, Lower Cedar Grove, to railroad grade	5	0

In the same region on the east bank of the river at McConnell, this sandstone is 20 to 30 feet thick, while immediately opposite on the west bank, its horizon is represented by less than 3 feet of shale and fire clay, bringing the Cedar Grove and Lower Cedar Grove Coals almost together, an illustration of the lenticular character of the sandstone along its western margin.

No quarries were observed on this ledge in either county.

The Lower Cedar Grove Coal.

As mentioned above under the description of the Cedar Grove Coal, the lower bench, represented by Nos. 4 and 5 of the type section of the latter vein, given under the description of this bed, splits off into a separate and distinct seam, due to the rapid thickening of the Middle Cedar Grove Sandstone in the southeastern portions of the two counties, its interval below the upper bench varying from 30 to 50 feet on Guyandot River above Stollings in Logan County, to 75 feet on Mate Creek in Mingo, where it is locally known as the "Lower Thacker." After separating from the upper bench, its splint and gas coals maintain their same relative position as when mined together on the waters of Island Creek in the Holden region; that is, in the upper half, splint coal predominates, and in the lower half, gas coal prevails. The opposite is true of the upper bench, which still holds the name **"Cedar Grove"** in this Report, the position of the two types of coal in the latter corresponding to their relationship when both benches are mined together.

The Lower Cedar Grove Coal nearly always has a massive sandstone roof (Middle Cedar Grove), which is an additional aid in distinguishing it from the upper bench of the Cedar Grove Coal, the latter nearly always being overlain with dark sandy shales with iron ore nuggets and plant fossils, the shales ranging in thickness from 20 to 50 feet.

The thickness, character and relative position of the Lower Cedar Grove Coal in the rock column are exhibited in the general sections in Chapter IV for Clothier-Beech Creek, Oilville, Naugatuck, Rawl, Matewan, Cedar and War Eagle; in the special sections of the Kanawha Series on preceding pages of this Chapter for Ramage, Stollings, Rum Creek, Buffalo Creek (Logan County), Rose Siding, Grapevine and Browning Fork; and in the logs of Coal Test Borings Nos. 51, 54, 55, 64, 69-75, 77, 88, 89, 93, 94, 96 and 99. The area of its development in minable thickness is closely approximated in Figure 15 in Chapter VIII. In this region, its crop follows nearly the same areas as outlined for the main Cedar Grove Coal on Map II.

In Logan County, during 1913, there were no commercial mines on this coal except as it becomes a part of the Cedar Grove proper in the Holden locality, but in Mingo it is mined as a separate bed quite extensively in Stafford District, near the head of Alum Creek, and at the lower opening of the Red Jacket, Jr., Mine on Mate Creek in Magnolia District.

The thickness, composition, and fuel value of the Lower Cedar Grove at the commercial mines, prospect openings, country banks and crop exposures are given in detail in Chapter VIII, along with an estimate by magisterial districts of its minable area and tonnage.

The Lower Cedar Grove Sandstone.

At 1 to 10 feet below the last coal described in the territory of this Report, there generally occurs a massive, persistent sandstone, similar in color and character to the Middle Cedar Grove ledge, and ranging in thickness from 20 to 30 feet. As this stratum has not been previously described, it is herein designated the **Lower Cedar Grove Sandstone** from its association below the coal of the same name. Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV for Big Creek, Logan, Chattaroy, Rawl, Little Coon Knob, and Cedar; in the Whitman Section, page 113; and in the logs of Coal Test Borings Nos. 64 and 101.

Only one small quarry was observed on this ledge in the area. This is located on the east bank of Island Creek, one-fourth mile south of Monitor, where Reger reports it gray in color and splitting readily into long blocks.

The Alma "A" Coal.

Immediately at the base of the last sandstone described and 20 to 30 feet below the Lower Cedar Grove Coal, and 10 to 20 feet above the Alma bed, there occurs a thin multiple bedded coal along Guyandot River southeastward from Stollings, ranging in thickness from 0 to 2 feet, that has not been previously described. It is herein designated the **Alma "A" Coal,** in harmony with the rules of geologic nomenclature, from its intimate association above the Alma seam. The following section, measured by Hennen along the C. & O. Railway grade,

½ mile north of Rolfe, Logan District, Logan County, is typical of its occurrence:

	Feet.	Inches.
Sandstone, massive, Middle Cedar Grove........	40	0
Coal, Lower Cedar Grove......................	2	6
Sandstone, massive, Lower Cedar Grove........	25	0
Shale, dark, sandy, with thin sandstone layers..	13	0
Coal, bony..........0' 4" Slate, dark gray.....0 3 Coal, bony...........0 2 Slate, gray..........0 9 Coal, bony...........0 5 Alma "A" (695' B)..	1	11
Fire clay and sandstone to railroad grade.......		

One mile southward, the following section, measured by Hennen along the east hillside of Guyandot River, shows the relation of the Alma "A" to both the Lower Cedar Grove and Alma Coals:

	Feet.	Inches.
Sandstone, massive, great cliff, Middle Cedar Grove	40	0
Coal, Lower Cedar Grove......................	4	0
Shale, blue, flaggy............................	9	0
Sandstone, flaggy, Lower Cedar Grove..........	5	0
Coal, bony..........0' 5" Slate, black.........0 6 Coal, bony..........0 5 } Alma "A" (775' B.).	1	4
Fire clay shale................................	1	0
Sandstone, massive............................	12	0
Slate, coaly....................................	0	2
Slate	2	0
Sandstone, massive............................	5	0
Shale	2	0
Coal, Alma....................................	2	2
Fire clay and shale, sandy....................	5	0
Sandstone, massive, Logan, to C. & O. Ry. grade	50	0
Concealed to river bed........................	20	0

When the Lower Cedar Grove Sandstone is present in its maximum development, it generally occupies most of the interval separating the Lower Cedar Grove and Alma Coals, thus cutting away the Alma "A" entirely. The thickness and stratigraphic position of the latter in other portions of the area are exhibited in the Logan Section, page 55, and in the logs of Coal Test Borings Nos. 71, 72, 74 and 78 in the same general region of Logan County. The coal was not observed in Mingo. It is quite evident that this vein is too thin, slaty and irregular to be classed as a minable bed.

The Alma Coal.

The Alma Coal of White,[11] belonging at its type locality in Magnolia District, Mingo County, at Mine No. 127, ½ mile northeast of Sprigg, 120 to 140 feet below the Cedar Grove seam and 100 to 120 feet above the Campbell Creek (No. 2 Gas) Coal and ranging in thickness from 3 to 4 feet, has a fine development in the territory of this Report. The following is its original type section as taken from page 405 of Vol. II(A) of the State Survey Reports:

				Feet.	Inches.
Coal, hard	0′	7″	Alma	3	0
Coal, softer	0	4			
Coal, hard	1	1			
Coal, soft	0	4			
Coal, hard, splint	0	8			

A parting of fire clay shale, ranging in thickness from 0 to 18 inches, frequently develops between the bottom two members of the section. Especially is this true along the Guyandot River in Logan County. In the latter area, it is this bed that is mined along the last mentioned stream at Big Creek and Stone Branch, where it was erroneously correlated with the Campbell Creek (No. 2 Gas) vein on pages 379-380 of the last mentioned Report. It is the "Draper" seam of Logan and not the Powellton Coal as given on pages 351-352 of the same Report.

Its thickness, character and stratigraphic position in the two counties are exhibited in the general sections in Chapter IV for Big Creek, Chapmanville, Clothier-Beech Creek, Logan, Oilville, Manbar-Man, Kermit, Naugatuck, Chattaroy, Rawl, Sprigg, Little Coon Knob, Williamson, Matewan and Cedar; in the special sections on preceding pages of this Chapter for Chapman Branch, Stone Branch, Whirlwind, Ramage, Hughey, Peach Creek, Whitman, Stollings, Rum Creek, Marrowbone, Thacker and Browning Fork; and in the logs of Coal Test Borings Nos. 25-27, 29, 30-47, 47A, 49-51, 54-56, 64, 70-75, 78, 86, 88, 95, 99, 101, 154 and 155.

Northwestward from the Rawl region of Mingo along Tug

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[11] I. C. White Vol. II(A), W. Va. Geol. Survey, pp. 404-407; 1908.

Fork, the Alma Coal develops a tendency to split into three separate members, fine exposures of which occur along the N. & W. Railway grade between Williamson and Chattaroy, as revealed in the sections in Chapter VIII at Coal Exposures Nos. 680 and 681 on Map II.

As mentioned at the beginning of Chapter IV and under the description of the Dingess Limestone, page 165, the Alma Coal, as shown in the Hernshaw (Kanawha County) Section, page 44, was very carefully traced by Messrs. Hennen, Krebs and Reger, during 1913, along with adjacent members of the Kanawha Series, southwestward from the Lens Creek (Kanawha County) region to the Logan-Lincoln Line at Big Creek and the Logan-Boone Line at Clothier, and thence by the authors on southwestward to the type locality of the Alma Coal on Tug Fork, and the fact demonstrated without doubt that it correlates with a coal not previously recognized in the Kanawha River region of the State that belongs 25 to 35 feet below the Cedar Grove and 80 to 90 feet above the Peerless or upper bench of the Campbell Creek (No. 2 Gas) bed.

The localities of its best development in both counties where it is probably of minable dimensions are approximately outlined on Figure 16 in Chapter VIII. Its thickness, composition and fuel value at the several commercial mines, prospect openings, country banks and crop exposures are given in detail on subsequent pages of the same Chapter, along with an estimate of the minable area and tonnage by magisterial districts.

The Logan Sandstone.

At 1 to 5 feet below the last coal described, there occurs a very persistent, massive, gray, medium grained and micaceous sandstone, ranging in thickness from 30 to 50 feet, that has been quarried in a small way along the C. & O. Railway grade at the east corporation line of Logan, due south of the William Ellis No. 1 Well (No. 76 on Map II). As this stratum has not been previously described, it is herein designated the **Logan Sandstone.** It generally forms cliffs and steep bluffs around the hillsides along the line of its crop, which is 50 to 150 feet below the Cedar Grove Coal, the crop of the latter being shown on Map II. In fact, this stratum, owing to its persistence and massive character, aided very materially in the accurate tracing of the Cedar Grove, Alma and Campbell Creek (No. 2 Gas) Coals southwestward from Kanawha Valley to Tug Fork in Mingo. Its thickness and stratigraphic position in the territory of this Report are exhibited in most of the sections and borings referred to above under the description of the Alma Coal.

In Logan County, it is this sandstone that forms cliffs along the bed of Rum Creek from Rolfe up to the mouth of Second Righthand Fork.

The following section was measured by Reger at a quarry on this ledge on the west bank of Whitman Creek, a branch of Copperas Mine Fork of Island, 0.2 mile south of the mouth of the first mentioned stream, at an elevation of 695′ B.:

	Feet.	Inches.
Concealed		
Sandstone, massive, medium coarse, very micaceous, coarse, hard, light gray in color, Logan	55	0
Concealed to bed of Whitman Creek	5	0

The quarry face is about 150 feet long and is driven back about 30 feet into the hill, bedding planes being numerous.

Reger measured the following section at another quarry in the Logan Sandstone in a railway cut along the east side of Island Creek, at Monitor, 1¼ miles south of Logan:

				Feet.	Inches.
Shale					
Coal	3′	2″	Cedar Grove ("Island Creek")	6	10
Slate	0	3			
Coal	3	5			
Sandstone, shaly, Lower Cedar Grove				8	0
Concealed				50	0
Coal, Alma				4	0
Sandstone, massive, grayish white, quarry rock, Logan				35	0
Concealed to bed of Island Creek				15	0

According to Reger, it splits readily into small building blocks at this point, from which the stone is used in the construction of the power houses of the Monitor Coal & Coke Company and the Yuma Coal & Coke Company.

Owing to its accessibility and wide distribution, the Logan Sandstone is probably the most valuable building rock in the two counties.

The Little Alma Coal.

At 1 to 10 feet below the last sandstone described, 40 to 60 feet below the Alma Coal at the type locality of the latter bed in Mingo County and 50 to 60 feet above the Campbell Creek (No. 2 Gas) vein, there occurs a thin, multiple bedded and impure coal that is fairly persistent in the territory of this Report. The following section, measured by Hennen just above the mouth of Lick Creek, 2.3 miles east of Williamson, along the N. & W. Railway grade, is typical of this seam:

				Feet.	Inches.
Coal, gas	**0′**	**2¾″**	**Little Alma (678′ L.)**	**2**	**4**
Slate	**0**	**0¼**			
Coal, splinty	**1**	**9**			
Shale, gray	**0**	**2**			
Coal, slaty	**0**	**2**			

Here it belongs 50 feet below the Alma Coal and 55 feet above the Campbell Creek (No. 2 Gas) bed. As this vein has not been previously described, it is herein designated the **Little Alma Coal.**

Its thickness and relative position in the rock column are exhibited in the general sections in Chapter IV for Big Creek, Kermit, Williamson and Rawl; in the special sections of the Kanawha Series in preceding pages of this Chapter for Chapman Branch, Stollings, Rum Creek and Rose Siding; and in the logs of Coal Test Borings Nos. 54, 55, 78, 80-83, 86-89 and 101.

In **Logan County,** in the eastern point of Chapmanville District, Gawthrop reports 6 inches of coal visible in the public road on the north bank of Gore Fork, 1 mile southeast of Curry, at an elevation of 1155′ B., 40 to 50 feet below the Alma Coal, that should represent the Little Alma vein.

In the northwestern point of Logan District, Reger reports 1 foot of coal at this horizon at an elevation of 1060′ B., near the road fork, ¾ mile southeast of the common corner of Chapmanville, Logan and Harvey Districts.

In the eastern portion of Triadelphia District, Logan County, Hennen measured the following section at the crop of this bed on the north bank of Buffalo Creek, 2¼ miles east of Craneco and 0.9 mile east of the mouth of Toney Fork:

	Feet.	Inches.
Sandstone, massive, Logan	35	0
Coal, Little Alma (1365' B.)	1	9
Concealed and shale	15	0
Coal	0	10
Concealed	20	0
Coal, Campbell Creek "Rider"		

In **Mingo County,** Lee District, the following aneroid section was measured by Hennen down the point on the east side of the mouth of Sycamore Creek, 1.5 miles east of Williamson:

	Feet.	Inches.
Fire clay shale	3	0
Coal. with partings, Alma	7	2
Concealed	15	0
Sandstone, massive, Logan	30	0
Shale	15	0
Sandstone, flaggy	4	0
Coal, Little Alma (710' B.)	1	0
Shale	10	0
Sandstone, massive, Malden	25	0
Shale, to railroad grade	5	0

In the same district, Gawthrop measured the following section at a prospect in the Little Alma Coal, on the south bank of Sycamore Creek, 0.7 mile west of Cinderella:

	Feet.	Inches.
Shale, dark	10	0
Coal, Little Alma (775' B.)	1	2
Shale		

In Magnolia District, the following section was measured by Hennen at a prospect in the Little Alma vein on the north hillside of Sulphur Creek, ¼ mile south of Matewan, at an elevation of 955' B.:

				Feet.	Inches.
Coal, Alma, with partings				5	9
Slate, concealed and shale				55	0
Coal, gas	0′	2″	Little Alma	3	11
Shale, gray	1	0			
Coal, gas	1	2			
Shale, gray	0	4			
Coal, slaty	0	3			
Shale, gray, with coal streaks	0	7			
Coal, gas	0	5			

At this point, the Little Alma belongs 190 feet below the Cedar Grove (Upper Thacker) Coal at the Magnolia Coal Company's Mine (No. 98 on Map II), and 55 feet above the Campbell Creek (No. 2 Gas) vein.

In the same district, Gawthrop measured the following section in a railroad cut along Mate Creek, 3.2 miles northeast of Matewan and ¾ mile below the mouth of Ali Branch, that exhibits its multiple bedded and slaty character:

				Feet.	Inches.
Shale, dark				8	0
Coal, gas	1′	3″	Little Alma (885′ B.)	2	7½
Shale	0	1			
Coal	0	2½			
Shale	0	1½			
Coal	0	0½			
Shale	0	2			
Coal	0	9			
Shale					

On Marks Branch of Mate Creek, 1.3 miles northwest of Meador, Gawthrop obtained another section at the crop of this coal in the run, at an elevation of 1055′ B., as follows:

				Feet.	Inches
Shale, gray					
Coal, gas	1′	3″	Little Alma	1	10½
Shale, gray	0	0½			
Coal, gas	0	2			
Shale	0	2			
Coal	0	3			
Concealed					

On the same stream, it is this coal that crops at an elevation of 1085′ B., opposite the mouth of Straight Creek, according to Hennen, where it has practically the same section as given in the last two exposures above.

In the southeastern edge of Magnolia District, Gawthrop reports a coal 18 inches thick at this horizon in the road near the head of Grapevine Fork of Beech Creek, 1.6 miles due west of the mouth of Foundation Fork, at an elevation of 1225′ B., 75 feet below an opening (No. 696 on Map II) in the Alma bed.

In the northern edge of Stafford District, Hennen measured the following section at an opening on the south bank of Browning Fork of Horsepen Creek, 5 miles northwest of Gilbert, belonging 40 to 50 feet above the Campbell Creek (No. 2 Gas) vein:

	Feet.	Inches.
Shale, sandy	**8**	**0**
Coal, gas, Little Alma	**1**	**4**
Slate		

Elevation of coal, 1220′ B.

From the foregoing data on the Little Alma Coal, it is readily observed that it cannot be classed as a minable vein in the territory of this Report, but it is of special interest in that it serves as an additional guide in the correlation of the adjacent members of the Kanawha Series.

The Peerless Sandstone.

The Peerless Sandstone of Krebs,[18] belonging at the mouth of Campbell Creek in Kanawha County, 30 to 40 feet above the Campbell Creek (No. 2 Gas) Coal, is very persistent in the territory of this Report. Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV for Big Creek, Manbar-Man, Chattaroy, Rawl, Williamson, Cedar and War Eagle; in the special sections of the Kanawha Series on preceding pages of this Chapter for Stone Branch, Rum Creek and Marrowbone; and in the logs of Coal Test Borings Nos. 80-88, and 99 on Map II.

Only one quarry on it was observed in either county, this being in Logan, on the south bank of Copperas Mine Fork of Island Creek, 3 miles northeast of Holden and just below the mouth of Mud Fork, at an elevation of 660′ B., where the following section and data were obtained by Reger:

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[18] C. E. Krebs, Kanawha County Report, W. Va. Geol. Survey, p. 281; 1914.

	Feet.	Inches.
Sandstone, massive, Peerless..................	50	0
Coal, Campbell Creek (No. 2 Gas)..............	2	0
Concealed to bed of creek......................	3	0

"Quarry face is about 100 feet long."

The Campbell Creek Limestone.

The Campbell Creek Limestone of White,[14] belonging 20 to 40 feet above the coal of the same name at the type locality of the latter in Kanawha County, is widely persistent in the territory of this Report. As in the Kanawha Valley, this stratum generally takes the form of lens-shaped concretions and often exhibits a "cone-in-cone" structure. It is nearly always silicious and does not appear to carry any marine fossils, although Krebs[15] reports a marine fauna at this horizon near Bald Knob in Boone, and Kayford in Kanawha County, the former area adjoining Logan County on the northeast.

Its thickness and stratigraphic position are exhibited in the special sections of the Kanawha Series given on preceding pages of this Chapter for Chapman Branch and Robinette.

In the northern edge of Chapmanville District, **Logan County,** the following section was measured by Hennen on its crop along the east bank of Limestone Run, 0.4 mile northwest of Big Creek railway station, at an elevation of 630′ B., 50 feet above the Campbell Creek (No. 2 Gas) Coal, and about the same interval below the Alma seam:

	Feet.	Inches.
Shale, dark gray, with iron ore nodules.........	20	0
Limestone, dark gray, silicious, lenticular, Campbell Creek, 0" to............................	1	0
Shale, dark, with iron ore nodules, to bed of run	7	0

In the southern edge of the same district, Reger measured the following section at its crop on the south bank of Whiteoak Branch of Smokehouse Fork, 1 mile southwest of Shively:

	Feet.	Inches.
Shale, sandy...................................		
Limestone, hard, Campbell Creek..............	1	0
Shale, sandy, with iron ore nodules.............	20	0
Coal, Campbell Creek (No. 2 Gas), with partings	3	7½

Elevation of limestone, 915′ B.

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[14] I. C. White, Bull. No. 65, U. S. Geol. Survey, p. 168; 1891; and Vol. II, W. Va. Geol. Survey, p. 566; 1903.

[15] C. E. Krebs, Boone County Report, W. Va. Geol. Survey; 1914.

In the northern portion of Logan District, the crop of this limestone is exposed along the north edge of the public road on Hewett Creek, just west of the mouth of Sycamore Branch, 0.7 mile southwest of Lake, at an elevation of 1030' B., about 50 feet above the Campbell Creek (No. 2 Gas) Coal and the same interval below the Alma seam, where the following section was measured by Hennen:

	Feet.	Inches.
Shale, sandy	20	0
Limestone, in lenses, silicious, Campbell Creek, 0" to	1	0
Shale, sandy, to bed of creek	5	0

In **Mingo County,** Lee District, it is this limestone that crops at the west portal of the N. & W. Railway tunnel, 1 mile west of Williamson, where the following section was measured by Hennen:

	Feet.	Inches.
Coal Alma		
Sandstone, massive, Logan	30	0
Shale, dark, with iron ore nodules	15	0
Limestone, in lenses, 4' to 5' in diameter and 18" to 24" thick, silicious, Campbell Creek, and shale	5	0
Shale, with iron ore nodules, to railroad grade	5	0
Elevation of limestone, 670' B.		

Here it comes about 50 feet above the Campbell Creek (No. 2 Gas) Coal.

In the central portion of Magnolia District, the crop of this limestone is exposed along the north edge of the public road on Mate Creek, 0.6 mile northwest of Meador and 100 yards above the mouth of Straight Fork, where, according to Hennen, it is 15 inches in thickness, at an elevation of 1095' B., 50 feet above the Campbell Creek (No. 2 Gas) Coal.

The limestone is too thin, silicious and irregular to be of much economic importance in the Logan-Mingo area, but it is of special interest in that it aids in the correlation of the adjacent members of the Kanawha Series.

The Campbell Creek (No. 2) Gas Coal.

The Campbell Creek (No. 2 Gas) Coal of White[16], belonging at its type locality near the mouth of the creek of the same name in Kanawha County, 20 to 40 feet below the last limestone described, is the most valuable and widely persistent coal seam in the territory of this Report. As mentioned under the description of the Dingess Limestone, this coal was carefully traced during 1913 from the mouth of Campbell Creek in the last mentioned county southeastward up the Kanawha River and Lens Creek to the mines in this bed at Hernshaw, where the following type section of the original Campbell Creek Coal, including all benches, was measured at Mine No. 2 of the Marmet Coal Company, at an elevation of 736′ L.:

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[16] I. C. White, Bull. No. 65 U. S. G. Survey, p. 170; 1891; and Vol. II, W. Va. Geol. Survey, pp. 567-584; 1903.

					Feet.	Inches.
1.	Sandstone					
2.	Slate, draw, 0″ to				0	3
3.	Coal, gas	1′ 1″	"Peerless" or upper bench 3′ 6″	Campbell Creek	6	2
4.	Coal and slate, interlaminated 0″ to	0 2				
5.	Coal, harder	2 3				
6.	Slate, dark, with coal streaks	0′ 2″	0 8			
7.	Slate, gray and hard	0 6				
8.	Coal, splinty, harder, lower bench		2 0			

Its position in the measures at this point is accurately shown in the Hernshaw Section, page 44. The logs of two bore holes, located 1400 and 2040 feet, respectively, southwest of Bore Hole No. 1, the log of which was used in the revision of the last mentioned section, show the expansion of No. 6 of the above section to a thickness of 15 to 20 feet, the usual interval separating the two benches of the Campbell Creek Coal along the Kanawha River in the Marmet region as revealed in the section at the top of page 511 of Volume II of the State Survey Reports. Attention is called to No. 4—**coal and slate, interlaminated**—in the upper bench or Peerless division, as it is a characteristic feature not only associated with this portion of the bed in Boone, Logan and Mingo Counties, but also on the Kanawha River, just below Winifrede Junction, where the two benches are separated by an interval of 35 to 40 feet, the base of the lower of which comes 212 feet—hand-level measurement—below the fossiliferous Dingess Limestone horizon, and at an elevation of 625′ L. These features are mentioned here in connection with the above type section, since the Campbell

Creek Coal, as represented at Hernshaw, was further traced, during 1913, along with the overlying Alma, Cedar Grove and Williamson Coals and the Dingess Limestone southwestward to the Boone-Logan County Line, both at Big Creek and Clothier, and thence to Tug Fork in Mingo. Along the base lines carried across Boone County by Messrs. Hennen, Krebs and Reger, as mentioned in the beginning of Chapter IV, page 43, both benches of the Campbell Creek, although separated usually by 25 to 35 feet of measures, are generally present in normal development to near the head of Drawdy Creek, but in Boone, farther southwest, the lower bench seems to disappear from the measures in the vicinity of Danville, Madison, Big Creek and Clothier, as revealed both in crop exposures and the logs of diamond drill borings, probably permitting the upper bench to rest directly upon the Brownstown Sandstone.

In the territory of this Report, its thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Big Creek, Clothier-Beech Creek, Logan, Manbar-Man, Kermit, Naugatuck, Chattaroy, Rawl, Sprigg, Little Coon Knob, Williamson, Matewan, Cedar and War Eagle; in the special sections of the Kanawha Series on preceding pages of this Chapter for Chapman Branch, Stone Branch, Hughey, Peach Creek, Mud Fork, Stollings, Rum Creek, Sherman, Robinette, Buffalo Creek (Mingo), Marrowbone, Maritime Mine, Rose Siding, Thacker, Delorme and Browning Fork; and in the logs of Coal Test Borings Nos. 29-47, 47A, 49, 50, 73, 80-89, 154 and 155. Its detailed crop is shown by an appropriate symbol on Map II. The structure contours in green on the same map exhibit its elevation above sea level at all points of the two counties. Figure No. 17 in Chapter VIII shows the approximate minable area.

In **Logan County,** this bed is the one operated commercially at Mines Nos. 134, 135 and 136 at Earling and Manbar, along the east hillside of Guyandot River, where its screenings and "bug dust" from cuttings are coked in the only ovens in Logan and Mingo, an account of which is given on subsequent pages in Chapter VIII. It is the lower of the three seams that are being mined commercially on Buffalo Creek between Man and Amherstdale. On page 297 of Volume II(A) of the State

Survey Reports, it was erroneously correlated at Logan with the Eagle bed.

The following is a type section of the Campbell Creek (No. 2 Gas) Coal for the northern portion of Logan County:

				Feet.	Inches.
1.	Coal, gas, 3″ to	0′	6″		
2.	Coal and slate, black, interlaminated, 4″ to	0	6		
3.	Coal, gas, 12″ to	1	3		
4.	Coal, semi-splint, 12″ to	1	3		
5.	Slate, dark gray, 8″ to	0	0		
6.	Coal, splinty, 10″ to	1	0	4	6

No. 2 of this section persists throughout both counties. In the southeastern portion of Logan, as revealed at the mines on Guyandot River and Buffalo Creek, No. 5 of this section has a tendency to develop into a "twin slate," the following being typical for this locality:

						Feet.	Inches.
Coal gas, 4″ to				0′	6″		
Coal and black slate, interlaminated, 3″ to				0	6		
Coal, gas				2	0		
Slate, gray, ½″ to	0′	3″	"twin slates"	0	8		
Coal, gas	1	0					
Slate, gray 1″ to	0	4					
Coal, gas, with splint layers, 2′ to				2	6	6	2

In **Mingo County,** it is this seam that has long been mined at Kermit and Warfield, where it is locally known as the "Warfield Coal." Here it carries its usual slaty coal a few inches below the top. On up Tug Fork, it is known locally as the "Burnwell," "Freeburn," "Rawl," and "Upper War Eagle." The following section, measured at an exposure of this bed by Hennen, one mile north of Sprigg, is typical of the Campbell Creek (No. 2 Gas) Coal on the waters of Tug:

							Feet.	Inches.
1.	Coal, gas				0′	3″		
2.	Coal and black slate, interlaminated				0	6		
3.	Coal gas				1	4		
4.	Slate, gray	0′	1″	"twin slates" (16½″)	1	4½		
5.	Coal, gas	0	0½					
6.	Shale, gray	1	3					
7.	Coal, gas				2	1	5	6½

The section is almost a duplicate for the same bed in Logan County and bears a marked resemblance to the upper bench of the Campbell Creek (No. 2 Gas) Coal at its type locality in Kanawha County; especially so as it is represented at Winifrede Junction and Hernshaw. In Mingo County, the "twin slates," represented by Nos. 4, 5 and 6 of the last section, are not generally present, but are liable to develop at any time.

In the extreme southeastern portion of Mingo, the following typical section of the Campbell Creek (No. 2 Gas) Coal was measured by Hennen at an old opening of the Margaret Mining Company on the head of the first right-hand branch of Star Fork of Turkey Creek, 1.8 miles northeast of War Eagle, at an elevation of 1635′ B., where it is known locally as the "Upper War Eagle:"

			Feet.	Inches.
Coal, gas	0′	3″		
Coal and black slate, interlaminated	0	6		
Coal, gas	2	4		
Slate, dark gray	0	1½		
Coal, semi-splint	1	2		
Coal, gas	0	10	5	2½

It is readily observed that there is a striking similarity between the two sections last given.

On page 330 of Volume II(A) of the State Survey Reports, the **"Upper War Eagle" Coal** was tentatively correlated with the **Eagle bed** of the Kanawha Valley, but the results of careful tracing during 1913 show that the position given for this coal in the War Eagle Section, page 88, is the correct one.

Just what has happened to the lower bench of the Campbell Creek (No. 2 Gas) Coal, as represented at Hernshaw, in the intermediate region across Boone to the area under discussion is one of the problems that has puzzled the authors of this Report. Its solution will come later when the southwest half of Boone County has been more thoroughly prospected with diamond drill borings and coal openings. It is very probable that it is represented by the bench immediately below the "twin slates" in the above type sections for the Logan-Mingo area. Hence, it was thought best to carry the whole bed under the joint name of **"Campbell Creek (No. 2 Gas) Coal"** in this Report for both scientific and commercial reasons.

The following section, obtained by Hennen and Reger along a railway cut, just southwest of the C. & O. Railway bridge over the Guyandot River at Logan, shows a coal lying apparently too close the main bench of the Campbell Creek seam to represent the Powellton (Brownstown) Coal, that may correlate with this lower bench. It, however, disappears southeastward up the Guyandot River:

			Feet.	Inches.
Sandstone			6	0
Coal, semi-splint	1′ 6″	Campbell Creek (Upper Bench)	1	9
Slate, gray	0 1			
Coal	0 2			
Sandstone, massive, micaceous			20	0
Coal, semi-splint	0′ 10″	Campbell Creek? (Lower Bench?)	1	0
Shale, gray, with nodular limestone concretions and plant fossils	4 0			
Slate, black	0 8			
Coal, semi-splint	0 4			
Fire clay			0	6
Sandstone, shaly, to railroad grade			4	0

One-half mile northward, the section of the Campbell Creek (No. 2 Gas) Coal, as revealed at Mine No. 739 on Map II, is exhibited in the Logan Section, page 55, as also the Powellton (Brownstown) Coal, 47 feet—hand-level measurement—lower in the measures.

The thickness, composition and fuel value of the Campbell Creek (No. 2 Gas) Coal at the several commercial mines, country banks, prospect openings and crop exposures, along with an estimate of its minable area and tonnage by magisterial districts, are given on subsequent pages in Chapter VIII.

The Brownstown Sandstone.

The Brownstown Sandstone of White[17], belonging immediately at the base of the last coal described and ranging in thickness from 25 to 50 feet, is quite massive and persistent in the territory of this Report. Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV for Chapmanville, Logan, Manbar-Man, Kermit and Chattaroy; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Peach Creek, Rose Siding, Thacker, Delorme and Devon.

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[17] I. C. White, Vol. II, W. Va. Geol. Survey, p. 586; 1903.

Only one quarry was observed on this ledge in either county, this being on the east hillside of Guyandot River, ½ mile north of Logan, where the following section was measured by Reger:

		Feet.	Inches.
Coal, Campbell Creek (No. 2 Gas)		2	6
Fire clay		1	0
Sandstone, shaly	Brownstown	10	0
Sandstone, massive			

The quarry is evidently in the top portion of this stratum.

On the same hillside of Guyandot River, 1.6 miles southeast of Manbar, this sandstone, according to Hennen, makes cliffs along the public road between Henry Hollow and Pine Branch, 40 to 60 feet in height, has cut away entirely the Powellton (Brownstown) Coal, and frequently rests unconformably on the underlying black, sandy and laminated shales, the latter ranging in thickness from 30 to 50 feet.

Southeastward along Buffalo Creek, it is this sandstone that makes the cliffs extending 40 to 50 feet above the bed of the latter stream, ¼ mile above Accoville, and 4 miles farther up Buffalo, opposite Sydnor railway station.

Southeastward in the same district, this stratum makes a line of prominent cliffs along both hillsides of Huff Creek in the vicinity of Cyclone, upon which rests the Campbell Creek (No. 2 Gas) Coal.

In Magnolia District, Mingo County, the Brownstown Sandstone is a very prominent cliff maker at Matewan, ranging in thickness from 40 to 60 feet, and being yellowish-gray in color, medium grained and somewhat flaggy and current-bedded. The latter feature in many localities would prevent its quarrying into large blocks, but, as with the Logan Sandstone, its accessibility, along the Guyandot River and in southeastern Mingo, renders it of considerable economic value for foundation stone. It is too hard, fine grained and slightly too high in alumina to crush into rock adapted to concrete work.

It is barely possible that the **Lower Peerless Sandstone** of Krebs[18], belonging in the interval between the two benches of the Campbell Creek (No. 2 Gas) Coal in the Marmet and Winifrede Junction regions of Kanawha County, has coalesced with the Brownstown, thus accounting for the disappearance of the lower bench of the latter coal in the Logan-Mingo area.

The Powellton "A" Coal.

A thin and impure coal, seldom exceeding 12 inches in thickness, occurs in the measures along Tug Fork in the Matewan region at 1 to 2 feet below the last sandstone described and 15 to 20 feet above the Powellton ("Hatfield Tunnel") bed. As this seam has not been previously described, it is herein designated the **Powellton "A" Coal.** Its stratigraphic position is exhibited in the Hatfield Tunnel (East Portal) Section, page 129. It is too thin and impure to warrant further description in this Report.

The Powellton (Brownstown) Coal.

The Powellton (Brownstown) Coal of White[19], belonging 70 feet below the Campbell Creek (No. 2 Gas) Coal and 20 to 40 feet below the last sandstone described in Kanawha County, is thin, irregular and double bedded in Logan and Mingo Counties, seldom exceeding 2 feet in thickness. Its character and relative position in the rock column are exhibited in the general sections in Chapter IV for Logan, Naugatuck, Little Coon Knob and Matewan; and in the special sections on preceding pages of this Chapter for Hatfield Tunnel (West Portal) and Hatfield Tunnel (East Portal).

In **Logan County,** Chapmanville District, the following section was measured by Hennen at its crop along the west bank of Stone Branch, just above Stone Branch Station:

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[18] C. E. Krebs, Kanawha County Report W. Va. Geol. Survey; 1914.

[19] I. C. White, Vol. II, pp. 511 and 585; 1903; and Vol. II(A), pp. 272 and 349; 1908; W. Va. Geol. Survey.

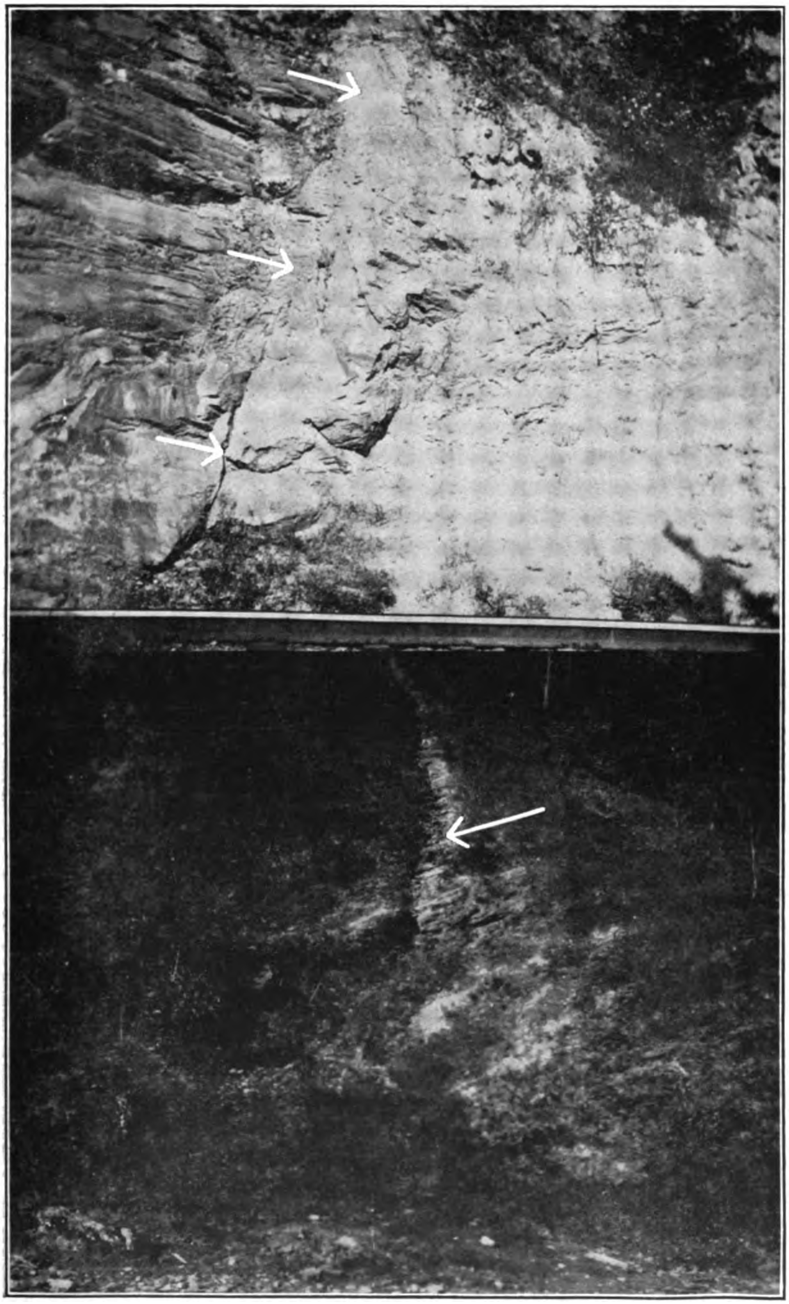

PLATE V.—Warfield Fault. Upper view shows crushed appearance of rocks along same, N. & W. Ry. grade, 0.6 mile southeast of Kermit—total displacement, 100 feet. Lower view shows Fault at point of white arrow on bank of Marrowbone Creek, 2½ miles northeastward. (See page 33).

	Feet.	Inches.
Coal, Campbell Creek (No. 2 Gas)		
Concealed and sandstone, massive, gray, fine grained, with shale layers, Brownstown	55	0
Slate, black	0	2
Coal, Powellton (Brownstown) (630′ B.)	0	7
Sandstone, shaly	5	0
Concealed, to bed of Stone Branch	5	0

In the same district, Reger obtained the following section at an exposure along Pigeonroost Branch of Crawley, 4 miles north of Holden:

				Feet.	Inches.
Sandstone, massive, Brownstown				10	0
Shale, gray, with iron ore				3	0
Coal, slaty	0′	5″	**Powellton (Brownstown) (900′ B.)**	4	1
Coal, semi-splint	2	4			
Shale, gray	0	4			
Coal, splint	1	0			
Fire clay					

The structure contours, as outlined on Map II, place the coal in this section 50 feet below the Campbell Creek (No. 2 Gas) bed, making the same correlate with the Powellton Coal. It is evidently a local thickening, as is revealed by the following section measured by Reger in the same district, along the east bank of Smokehouse Fork, ½ mile northeast of Shively, at a crop exposure 45 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal, and at an elevation of 835′ B.:

	Feet.	Inches.
Sandstone, massive, Brownstown		
Coal, Powellton (Brownstown)	1	0
Shale, dark	20	0

In Logan District, another section for the western portion of Logan County, measured by Reger and Gawthrop at an exposure of the Powellton (Brownstown) Coal along the north bank of Mud Fork, 2.5 miles northwest of Holden, and 0.3 mile west of the mouth of Rockhouse Branch, exhibits its irregular character:

				Feet.	Inches.
Sandstone, massive, making cliff, with well developed Sigillariae at base, Brownstown				15	0
Coal	0′	8″	**Powellton** (800′ B.)	16	4
Shale	15	0			
Coal	7	0			

Here it belongs 45 feet below the Campbell Creek (No. 2 Gas) Coal, at Opening No. 746 on Map II.

In **Mingo County,** Magnolia District, the thickness and character of the Powellton (Brownstown)—"Hatfield Tunnel"—Coal are shown in the two Hatfield Tunnel Sections, given on preceding pages of this Chapter. It appears to correlate with the "Hatfield Tunnel" bed, as suggested by I. C. White on pages 313-314 of Volume II(A) of the State Survey Reports.

The following section was measured with aneroid by Gawthrop along the east bank of Mate Creek at the Red Jacket Mine tipple, 0.7 mile northeast of the town of Red Jacket:

				Feet.	Inches.
Concealed					
Coal, Campbell Creek (No. 2 Gas), visible				1	4
Concealed				4	0
Sandstone, massive, Brownstown				34	0
Coal, gas	0'	8"	Powellton		
Shale, gray	0	1	(Elevation 780' B.)	0	11
Coal, gas	0	2			
Shale and concealed to railway grade				5	0

In the northeastern portion of the same district, Gawthrop measured the following section at the crop of this coal along the north bank of Oldhouse Branch of Beech Creek, 0.9 mile south of Hinch:

				Feet.	Inches.
Shale, bluish gray				4	0
Coal, shaly	0'	7"	Powellton		
Coal, gas	1	5	(Elevation 1210' B.)	2	0

Here it comes 65 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal as the latter's elevation is shown by structure contours on Map II.

In the same district, Gawthrop obtained a section at a prospect opening in the Powellton Coal along the northeast bank of Grapevine Fork of Beech Creek, 3.5 miles north of Devon:

				Feet.	Inches.
Sandstone, massive				10	0
Shale				2	0
Coal, gas, soft	1'	1 "	Powellton		
Slate, black	0	0¼	(Elevation 1160' B.)	2	0¼
Coal, gas, hard	0	11			
Slate					

According to the structure contours on Map II, it belongs here 45 to 50 feet below the Campbell Creek (No. 2 Gas) Coal.

In the northwest portion of Stafford District, it appears to be the Powellton (Brownstown) Coal that crops along the trail of Lefthand Fork of Left Fork of Bens Creek, 2 miles northeast of Glenalum, at an elevation of 1210′ B., where, according to Hennen and Gawthrop, it is only 15 inches in thickness, 65 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal.

About a mile and a half southwestward on the head of Alum Creek, Gawthrop measured the following section at a prospect opening in this coal in the edge of the creek, ¾ mile north of Glenalum town:

				Feet.	Inches.
Shale					
Coal	0′	2″	Powellton (Elevation 1270′ B.)	2	10
Slate	0	1			
Coal, gas	1	10			
Slate	0	0½			
Coal	0	1			
Slate	0	0½			
Coal	0	7			

From the foregoing data, it is quite evident that the Powellton (Brownstown) Coal in the Logan-Mingo area is too thin, slaty and irregular to be classed as a minable seam.

The Cannelton (Stockton) Limestone.

The Cannelton (Stockton) Limestone of White[20], belonging at its type locality in the Kanawha River Valley 75 to 100 feet below the Campbell Creek (No. 2 Gas) Coal and 45 to 50 feet above the Eagle Coal, is present in the territory of this Report, its position in the measures along Tug Fork in Mingo County being exhibited in the Rose Siding Section, page 131. There it comes 145 feet below the Campbell Creek Coal and 120 feet above the Eagle seam, or about midway between the Powellton ("Hatfield Tunnel") Coal and Matewan seam. In the Logan-Mingo area, the Cannelton Limestone is generally dark gray, hard, silicious and lenticular, seldom exceeding 2 to 3 feet in thickness.

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[20] I. C. White, Vol. II, W. Va. Geol. Survey, p. 586; 1903.

In **Logan County,** Chapmanville District, Reger measured the following section on the crop of a limestone that appears to represent the Cannelton (Stockton), along the east side of Smokehouse Fork, 1.1 miles south of Shively, at an elevation of 870′ B.:

	Feet.	Inches.
Coal, Campbell Creek (No. 2 Gas)	3	0
Concealed	20	0
Sandstone, shaly, Brownstown	20	0
Shale and concealed	25	0
Limestone, hard, silicious, Cannelton (Stockton)	2	0
Shale, black, with lenticular iron ore	3	0

In the northwest portion of Triadelphia District, Logan, the crop of this limestone is exposed along the northeast bank of Bull Hollow of Buffalo Creek, 0.8 mile southwest of Accoville, at an elevation of 845′ B., 100 feet below the Campbell Creek (No. 2 Gas) Coal, where the following section was measured by Hennen:

	Feet.	Inches.
Sandstone, shaly	15	0
Shale, bluish gray, flaggy, with iron ore nodules	20	0
Limestone, dark gray, silicious, non-fossiliferous, Cannelton	0	4
Shale, sandy, dark gray, to run bed	1	0

Westward along the north bank of Buffalo Creek, Hennen obtained another section at its crop, 0.2 mile west of Kistler railway station, as follows:

	Feet.	Inches.
Concealed, from Campbell Creek Coal horizon	85	0
Shale, dark gray	15	0
Limestone, dark gray, lenticular, non-fossiliferous, Cannelton (Stockton)	0	4
Shale, dark gray, sandy, laminated, to bed of Buffalo Creek	35	0
(Elevation of limestone, 800′ B.)		

In **Mingo County,** Magnolia District, it is this limestone that crops along the public road, 0.4 mile west of Matewan, 110 feet below the Campbell Creek (No. 2 Gas) Coal, at an elevation of 740′ B., where the following section was measured by Hennen:

	Feet.	Inches.
Coal, Powellton ("Hatfield Tunnel")		
Shale, dark gray, flaggy and sandy	20	0
Limestone, Cannelton (Stockton), in lenses, 4 to 5′ in diameter and 8 to 10″ in thickness, in 10′ of dark flaggy shale	10	0

The above section is additional evidence that the "Hatfield Tunnel" Coal correlates with the Powellton (Brownstown) of the Kanawha River region.

It is only 6 inches thick at its crop along the public road on the north hillside of Tug Fork, 0.8 mile southeast of Matewan, at an elevation of 815′ B., 10 to 15 feet above the Matewan Coal and Matewan Sandstone.

From the foregoing data, it is quite evident that the Cannelton (Stockton) Limestone is too thin, silicious and irregular to be of much economic importance, except to add slightly to the fertility of the soil in the immediate region of its crop. It is of special scientific interest in that it has aided greatly in the revision of former correlations of the members in the lower half of the Kanawha Series in Logan and Mingo Counties. No fossils were observed in this stratum.

The Matewan Coal.

On the point immediately at the mouth of Mate Creek, a multiple bedded coal is exposed directly over a quarry in the Matewan Sandstone, 60 feet below the Powellton ("Hatfield Tunnel") Coal, where the following section was measured by Hennen:

				Feet.	Inches.
Shale, sandy				15	0
Coal	0′	0½″	Matewan Coal (730′ B.)	3	2½
Shale, gray	2	0			
Coal, gas	0	5			
Coal, splinty	0	9			
Fire clay and shale				5	0
Sandstone, massive, light gray in color, medium grained, quarried, Matewan				30	0

The thickness and relative position of this coal in the rock column are exhibited in the general sections in Chapter IV for Manbar-Man and Little Coon Knob; and in the special sections of the Kanawha Series for Hughey, Hatfield Tunnel (West Portal) and Browning Fork. As this seam has not been previously described, it is herein designated the **Matewan Coal.** Its crop in the territory of this Report may be readily determined, since it belongs slightly below midway between the Campbell Creek (No. 2 Gas) and Eagle Coal seams, the detailed crops of which are outlined on Map II.

In **Logan County,** Hennen measured the following section in the northwestern portion of Triadelphia District at its crop along the south side of the C. & O. Railway grade on Buffalo Creek, 0.3 mile southwest of Kistler, 50 feet below the Cannelton Limestone and 150 feet below the Campbell Creek (No. 2 Gas) Coal, at an elevation of 765′ B.:

			Feet.	Inches.
Shale, bluish gray, sandy			10	0
Coal, slaty	0′ 5″	Matewan	1	6
Shale, sandy	0 10			
Coal, slaty	0 3			
Shale, sandy and sandstone, shaly			4	0
Sandstone, massive, grayish white, medium coarse, Matewan, to railroad grade			6	0

The thickness and stratigraphic position of the Matewan Coal at the mouth of Buffalo Creek are shown in the Manbar-Man Section, page 60.

In the eastern portion of the same district, it appears to be this coal that is exposed along Muddy Bridge Branch of Huff Creek, 1.7 miles northeast of Cyclone, at an elevation of 1110′ B., where the following section was measured by Hennen:

	Feet.	Inches.
Coal, Campbell Creek (No. 2 Gas), with partings	11	5
Slate and concealed	140	0
Slate, black	2	0
Coal, gas, Matewan	1	2
Slate	3	0
Sandstone, massive, Matewan	40	0

In the same district, Hennen measured the following section at an exposure of the Matewan Coal in a ravine on the south hillside of Rockhouse Creek, 1.6 miles southwest of Man, just below the mouth of Spring Branch, at an elevation of 815′ B.:

			Feet.	Inches.
Sandstone, massive			25	0
Slate, black			1	0
Coal, gas, hard	0′ 7″	Matewan	1	1
Shale, gray	0 2			
Coal, gas	0 4			
Sandstone, massive, Matewan, to bed of creek			25	0

In passing up Tug Fork in **Mingo County,** the Matewan Coal first appears above drainage near the west portal of the Hatfield Tunnel, 1.5 miles westward from Matewan, its structure there being shown in the Hatfield Tunnel (West Portal) Section, page 129.

It appears to be this coal that is opened along the north bank of Beech Creek in the same district, one mile southwest of Hinch, at an elevation of 1115′ B., where it was reported to Gawthrop as having a thickness of 2 feet. The prospect digging had fallen shut.

In the north edge of Stafford District, the Matewan Coal has been opened on the east side of Browning Fork, 0.2 mile north of the mouth of Henry Branch, at an elevation of 1080′ B., where the following section was measured by Hennen:

				Feet.	Inches.
Sandstone, flaggy and shaly, and shale, flaggy...				10	0
Coal, gas............	0′	5½″	Matewan	2	3
Slate, dark gray.....	0	1½			
Coal, gas.............	1	8			
Slate					

In the southeast part of the same district, at the commercial mines on Turkey Creek, there occurs a very marked bench in the topography, about 60 feet above the Eagle ("Middle War Eagle") Coal, on which there is 20 inches of good coal, according to Geo. W. Coffey, Superintendent of the War Eagle Coal Company. This should correlate with the Matewan seam.

From the foregoing data on the Matewan Coal, it is very evident that it is too thin, slaty and irregular to be classed as a minable bed.

The Matewan Sandstone.

On Tug Fork in Mingo County, there occurs a massive, medium grained, micaceous and light gray sandstone, ranging in thickness from 30 to 60 feet, that has been quarried for building purposes at the east edge of Matewan, where it belongs 5 feet below the Matewan Coal as shown in the section given at this point under the description of the latter bed on a preceding page. As this stratum has not been previously described, it is herein designated the **Matewan Sandstone.** This is the only quarry observed on the ledge in either county.

Its thickness and stratigraphic position are exhibited in the general section in Chapter IV for Manbar-Man; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Maritime Mine, Rose Siding, Thacker, Delorme and Devon.

In **Logan County,** this sandstone is a prominent cliff-maker along Buffalo Creek and Guyandot River in the vicinity of Man railway station, 110 to 120 feet below the Campbell Creek (No. 2 Gas) Coal. The same is true along both hillsides of Huff Creek, eastward from Cyclone, where it comes 130 to 150 feet below the coal last mentioned.

In **Mingo County,** the Matewan Sandstone makes great cliffs, 30 to 60 feet in height, along both hillsides of Tug Fork, southeastward from Matewan to War Eagle, between which points it aided very materially in the accurate tracing of the Campbell Creek (No. 2 Gas), or "Upper War Eagle" Coal, its interval in this region below the latter seam being shown in the sections above mentioned.

The Eagle "A" Coal.

Immediately at the base of the last sandstone described and 30 to 50 feet above the Eagle Coal, there occurs a thin, fairly pure gas coal in the southeastern portions of Logan and Mingo Counties, that has not been previously described. In harmony with the rules of geologic nomenclature, it is herein designated the **"Eagle 'A' Coal"** from its intimate association above the Eagle seam. Its position in the measures is shown in the Manbar-Man Section, page 60. Owing to its nearness to the last mentioned bed, its horizon may be readily determined at any point, as the detailed crop of the Eagle is given on Map II.

In **Logan County,** this coal was noted only in Triadelphia District, its thickness and character at the mouth of Buffalo Creek being shown in the section last mentioned. The following section was measured by Hennen at a prospect opening in this coal on the south side of Oldhouse Hollow of Sandlick Branch, 2.2 miles northwest of Christian:

			Feet.	Inches.
Shale, black, laminated			15	0
Fire clay shale			1	6
Coal, gas	1' 0"	Eagle "A"	2	4
Coal, gas, harder	1 4			
Slate				

Elevation of coal, 1000' B.

Here it belongs about 160 feet below the horizon of the Campbell Creek (No. 2 Gas) seam.

In the same region, Hennen obtained another section of this coal at a prospect opening on the south hillside of Sandlick Branch, ¼ mile east of the junction of Rockhouse Branch and Road Fork:

			Feet.	Inches.
Slate, black			3	0
Sandstone			1	0
Coal, gas	1′ 0″	Eagle "A"	2	3
Coal, gas, harder	1 3			
Slate				

Elevation of coal, 1070′ B.

In the eastern portion of the same district, Hennen measured the following section at a prospect opening along the east side of Muddy Bridge Branch of Huff Creek, 1.8 miles northeast of Cyclone, in a coal that appears to represent the Eagle "A" seam:

			Feet.	Inches.
Sandstone, massive, making cliff, Matewan			40	0
Coal blossom			0	0
Shale, black, laminated			25	0
Coal, gas, soft	1′ 7½″	Eagle "A"	2	4½
Slate, gray	0 1			
Coal, gas, soft	0 8			

Elevation of coal, 1050′ B.

It is possible that the coal blossom immediately at the base of the Matewan Sandstone may represent the Eagle "A," and if so, then the lower coal represents the Eagle seam with the usually overlying Eagle Sandstone being absent from the measures.

In **Mingo County**, the Eagle "A" Coal was observed only in Stafford District. In the north portion of the latter area, Hennen and Gawthrop measured the following section at a prospect opening in what appears to be this coal along the north bank of Horsepen Creek, 0.8 mile westward from Hampden, at an elevation of 1030′ B.:

	Feet.	Inches.
Sandstone, massive, cliff rock, Matewan	15	0
Slate, black, laminated	6	0
Coal, gas. **Eagle "A"**	2	3
Slate		

It is barely possible that the above may represent the true Eagle, as also that exhibited in the following section by Gawthrop, at an opening on the west hillside of Big Fork of Gilbert Creek, 1.4 miles due west of Horsepen, at an elevation of 1185′ B.:

				Feet.	Inches.
Shale				3	0
Coal, gas	0′	4″	Eagle "A"	2	10¼
Shale, gray	0	0¾			
Coal, gas	1	0			
Bone	0	0½			
Coal	1	5			
Sandstone, shaly					

The following section was measured by Gawthrop at an opening that seems to be in the Eagle "A" bed, on the east side of Bens Creek, 0.4 mile southwest of Twisted Gun Gap, at an elevation of 1185′ B.:

Sandstone, massive				5	0
Coal	0′	2″	Eagle "A"	6	2
Shale	5	0			
Coal	1	0			
Sandstone, shaly					

The foregoing data on the Eagle "A" Coal in the territory of this Report show this bed attaining merchantable dimensions and purity at one or two openings and may furnish considerable fuel in the future as the other thicker and better seams approach exhaustion. However, owing to its thinness and irregularity and the uncertainty of its correlation in the southern portion of Stafford District, it was thought best not to class this coal as a minable bed; hence, no estimate was attempted of its probable minable area and tonnage.

The Eagle Sandstone.

The interval separating the last coal described and the Eagle Coal is generally occupied largely by a massive, fine grained, bluish gray and micaceous sandstone, ranging in thickness from 20 to 50 feet. As this stratum has not been previously described, it is herein designated the **Eagle Sandstone** from its association with coal of the same name. Its thickness and relative position in the rock column are exhibited in the general sections in Chapter IV for Chapmanville and Manbar-Man; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Hughey and Peach Creek. As shown in the section for Chapmanville, page 49, it appears to be this ledge that was once quarried for building purposes along the east hillside of Guyandot River and at the southeast edge of the latter town on the land of Oscar Ferrell. This is the only quarry observed on the Eagle Sandstone in the two counties. It is too hard and fine grained, and runs too high in alumina at most exposures to crush into sand adapted to the manufacture of concrete.

The Eagle Coal.

The Eagle Coal of White,[21] belonging from a few inches to 15 feet below the last sandstone described, 225 to 250 feet below the Campbell Creek (No. 2 Gas) Coal and 110 to 175 feet above the fossiliferous Eagle Limestone in the territory of this Report, as a minable bed, appears to be confined to a narrow belt extending northeast and southwest along the southeast border of both counties, the same being roughly approximated in Figure 18 on subsequent pages of Chapter VIII.

Its thickness, character and relative position in the rock column are exhibited in the general sections in Chapter IV for Chapmanville, Manbar-Man, Kermit and War Eagle; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Peach Creek, Maritime Mine, Rose Siding and Delorme. Its detailed crop is outlined on Map II. It is the first coal in descending order below the Campbell Creek (No. 2 Gas) seam that attains minable dimensions and regularity over any considerable area. As in its type locality in the Kanawha River region of the State, it is a soft coal of the "gas" type, as compared with hard "Splint" coals of the upper portion of the Kanawha Series, its physical appearance much resembling the New River Coals of the Pottsville Measures.

In **Logan County,** the Eagle Coal is either absent or quite thin and worthless except in the southeastern portion of Triadelphia District and about 5 square miles in the extreme southern point of Logan District. (See Figure 18.)

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[21] I. C. White, Bull. No. 65, U. S. G. Survey, p. 140; 1891; and Vol. II, W. Va. Geol. Survey, p. 587; 1903.

In **Mingo County,** practically the same condition exists, except in Stafford District. In the latter area, it attains a fine development on the waters of Turkey Creek, where it has long been mined commercially and locally known as the "Middle War Eagle" Coal. In this same region, the "Upper War Eagle" Coal was tentatively correlated with the Eagle bed on pages 330 and 335 of Volume II (A) of the State Survey Reports, but the results of careful tracing and the accurate determination of the horizons of the Campbell Creek (No. 2 Gas) Coal and the fossiliferous Eagle Limestone on Turkey Creek, show that the correlations given in the War Eagle Section, page 88, are very probably in harmony with the facts.

The thickness, composition and fuel value of the Eagle Coal at the commercial mines on the waters of Turkey Creek and at numerous prospect openings in southeastern Logan and Mingo, along with an estimate of the available area and tonnage by magisterial districts, are given on subsequent pages in Chapter VIII.

The Bens Creek Sandstone.

At 1 to 5 feet below the last coal described along Bens Creek and Turkey Creek in Stafford District, Mingo County, there occurs a massive, medium grained, micaceous, grayish brown sandstone, ranging in thickness from 10 to 30 feet, that is apparently a development of one of the parting slates of the Eagle Coal, resulting in the separation of a bottom member of the latter seam, as represented in the Kanawha River region, into a separate and distinct coal bed as is exhibited in the War Eagle Section, page 88. As this stratum has not been previously described, it is herein designated the **Bens Creek Sandstone** from its association with the underlying coal.

Its thickness and character are shown in sections given at openings of the Bens Creek Coal on subsequent pages in Chapter VIII. It is this stratum that makes the cliff along the hill road, 0.3 mile eastward from Twisted Gun Gap on the waters of Gilbert Creek at Coal Opening No. 146 on Map II in the

Eagle bed, where the following section was obtained by Hennen and Gawthrop:

	Feet.	Inches.
Coal, Eagle (Upper War Eagle) (See No. 146 on Map II)	4	11¾
Slate and concealed	5	0
Sandstone, massive, Bens Creek (1150′ B.)	30	0
Shale	10	0
Coal, gas, soft, columnar, Bens Creek	2	3

The Bens Creek Sandstone appears to be confined to Stafford District (Mingo) and the southeastern edges of Logan and Triadelphia Districts (Logan) or to the area approximated for the coal of the same name on Figure 19 in Chapter VIII.

No quarries were observed on this ledge in either county.

The Bens Creek Coal.

At 5 to 10 feet below the last sandstone described, 30 to 40 feet below the Eagle ("Upper War Eagle") Coal, 5 to 10 feet above the Decota Sandstone, 75 to 80 feet above the Little Eagle Coal and 125 to 140 feet above the fossiliferous Eagle Limestone, there occurs a soft, columnar, gas coal along the waters of Bens Creek in Stafford District, Mingo County, ranging in thickness from 18 to 34 inches, that has not been previously described. It is herein designated the Bens Creek Coal from its fine development on the latter stream. Its position in the measures is exhibited in the War Eagle Section, page 88. The latter shows that a parting shale—3″ in thickness—has developed near the middle of the seam in the southeast edge of Mingo County.

As suggested above under the description of the sandstone of the same name, this coal appears to represent a "split" off the main Eagle bed.

At Coal Opening No. 798 on Map II in the Eagle on Huff Creek, 0.3 mile west of Cyclone, Hennen reports 13 inches of coal separated from the former by only 18 feet of shale, that should correlate with the Bens Creek seam. This shows a marked decrease in the interval between the two coals, and strengthens the theory of the Bens Creek bed being a "split" off the main Eagle.

At Coal Opening No. 804 of Map II in the latter seam, located along the west hillside of Guyandot River, 0.8 mile southwest of Christian (See Chapter VIII for section), it appears quite probable that the lower bench (2′ 3″ of soft gas coal) represents the Bens Creek Coal, the Bens Creek Sandstone being represented by only 5 inches of gray shale.

The lack of exposures prevented its accurate tracing northward from Bens Creek to Man at the mouth of Buffalo Creek in Logan County. At the latter place, this coal was not observed, although the Eagle bed was definitely determined, as shown in the Manbar-Man Section, page 60.

The position of its horizon may be readily ascertained, as it belongs only 30 to 40 feet below the Eagle Coal, the detailed crop of which is given on Map II. Although seldom exceeding a thickness of 30 inches, it has been classed as a minable seam, owing to its purity in the region of its development, the approximate area of which is given on Figure 19, in Chapter VIII.

Its thickness, composition and fuel value, as represented at several prospect openings, are given on subsequent pages of the Chapter last mentioned, along with an estimate of its minable area and the tonnage by magisterial districts.

The Decota Sandstone.

The Decota Sandstone of Krebs,[22] belonging at its type locality on Cabin Creek, Kanawha County, in the interval separating the Eagle Coal from the underlying Little Eagle seam, is fairly persistent in the territory of this Report, being massive, medium grained, micaceous and light gray in color, ranging in thickness from 20 to 50 feet.

Its character and stratigraphic position are exhibited in the special sections of the Kanawha Series given on preceding pages of this Chapter for Hughey and Peach Creek in Logan County and Delorme in Mingo.

In **Logan County**, Triadelphia District, it appears to be this sandstone that makes the cliffs along the banks of Rockhouse Creek, eastward from Coal Opening No. 800 on Map II, one mile southward from Man, where it is massive, grayish-white and medium grained.

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[22] C. E. Krebs, Kanawha County Report, W. Va. Geol. Survey, p. 292; 1914.

Two miles eastward along the north bank of Huff Creek, it is this ledge that makes the cliffs just below the mouth of Three Springs Branch, where the following section was measured by Hennen:

	Feet.	Inches.
Coal, blossom, Eagle (825′ B.)		
Concealed	15	0
Sandstone, massive, buff, medium grained, micaceous, Decota, to bed of Huff Creek	40	0

The following section was measured with aneroid by Gawthrop at the crop of the Decota Sandstone along the east hillside of Bens Creek, Stafford District, **Mingo County,** 0.4 mile northeast of the mouth of Bear Fork:

			Feet.	Inches.
Sandstone, massive at top, flaggy at bottom, Bens Creek			50	0
Coal, gas, soft, Bens Creek			2	2
Concealed			3	0
Sandstone	5′	**Decota Sandstone**	35	0
Concealed	10			
Sandstone, flaggy	20			

No quarries on it were observed in either county.

The Little Eagle Coal.

The Little Eagle Coal of White,[23] belonging at its type locality near the base of the last sandstone described and 20 to 30 feet below the Eagle seam, was observed at several points in the territory of this Report, where it is a thin, double-bedded, soft, gas coal, being too irregular to be classed as a minable bed. Its thickness and stratigraphic position are exhibited in the Cedar Section in Chapter IV; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Hughey in Logan County, and Maritime Mine, Rose Siding, Thacker, Delorme and Cedar in Mingo. In the section for Delorme, page 133, it is shown to belong in the Tug River region 55 feet below the Eagle Coal, 26 feet above the Cedar Coal and about 100 feet above the base of the **marine fossiliferous Eagle Shale.**

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[23] I. C. White, Bull. No. 65, U. S. G. Survey, p. 177; 1891; and Vol. II, W. Va. Geol. Survey, pp. 592-593; 1903.

In **Logan County**, the following section was measured at what appears to be the crop of the Little Eagle at Peach Creek railway station, 2 miles northward from Logan, 235 feet below the Campbell Creek (No. 2 Gas) Coal:

	Feet.	Inches.
Shale, slightly flaggy	10	0
Coal, Little Eagle (690′ B.)	0	6
Shale, brown, and sandy, plant fossils	7	0
Sandstone, bluish gray, massive, medium grained, quarry ledge, Grapevine	15	0
Shale, dark, with streaks of iron, Eagle	10	0

Two miles northward, Reger and Gawthrop measured the following section at the crop of this coal along the public road and railway cuts, 0.3 mile southwest of Ralumco:

	Feet.	Inches.
Sandstone, shaly, Decota	10	0
Coal, Little Eagle (740′)	0	10
Fire clay shale	3	0
Sandstone, massive, Grapevine, concealed, and sandstone, massive, to railroad grade	77	0

Here it belongs about 240 feet below the Campbell Creek (No. 2 Gas) Coal, and 60 to 70 feet above the Lower War Eagle seam, the blossom of which is exposed along the public road at Ralumco at 665′ B.

In **Mingo County**, this coal first rises above Tug Fork in ascending the latter stream between Matewan and Thacker, and at the railway station at the latter place, the following section was obtained by Hennen:

			Feet.	Inches.
Sandstone and shale			15	0
Coal, gas, soft	0′ 5″	**Little Eagle** (725′ B.)	1	7
Shale gray	0 7			
Coal, gas, soft	0 7			
Shale to N. & W. Ry. grade			9	0

Here, it is separated by only 13 feet of sandy shales from an underlying coal that was once mined commercially at Cedar. It appears quite plausible that the latter is a "split" off the Little Eagle, an account of which will be given below under the description of the Cedar Coal.

In the southeast edge of Magnolia District, Gawthrop measured the following section at an opening in the Little Eagle Coal along Righthand Fork of Beech Creek, 2½ miles northeast of Devon, at an elevation of 1000′ B.:

				Feet.	Inches.
Shale, gray				10	0
Shale, dark				3	0
Coal, slaty	0'	4"	Little Eagle	2	0
Coal, gas	0	9			
Shale	0	3			
Coal	0	8			
Shale					

Nine-tenths mile northwestward, Gawthrop measured another section at a prospect opening in this coal along the east bank of Beech Creek, at an elevation of 950' B.:

				Feet.	Inches.
Shale, dark gray					
Coal, gas	0'	4"	Little Eagle	1	5
Slate	0	1			
Coal	1	0			
Shale and concealed					

In Stafford District, Gawthrop measured the following section at an opening in a coal that appears to represent the Little Eagle, along the east hillside of Leatherwood Creek, 0.5 mile north of the mouth of Wallace Fork and slightly over 3 miles northeast of Gilbert:

				Feet.	Inches.
Shale, gray				5	0
Coal, slaty	0'	1"	Little Eagle	3	6
Shale, dark gray	1	7			
Coal, gas	1	0			
Coal, gas, harder	0	10			

Elevation of coal, 1260' B.

In the same district, Gawthrop measured the following section at a prospect in what seems to be the Little Eagle Coal on the waters of Stoffer Branch, 1 mile southeast of Gilbert, at an elevation of 1275' B.:

				Feet.	Inches.
Shale, gray				8	0
Coal, gas	0'	8"		2	3
Slate	0	2			
Coal, slaty	0	2			
Coal gas	1	3			
Shale					

From the foregoing data, it is evident that the Little Eagle Coal, as limited in the Logan-Mingo area, is too thin and carries too much shale and slate to be considered a merchantable seam.

The Cedar Coal.

At Cedar, Mingo County, a coal was once mined (See Coal Mine No. 151 on Map II) on a commercial scale by the Majestic Colliery Company at an elevation of 895′ B., only 16 feet below the coal last described, 40 feet above the marine fossiliferous Eagle Limestone and Shale, and 70 feet above the Lower War Eagle Coal, according to Hennen, a type section of which is shown in the Cedar Section, page 86. On page 332 of Volume II (A) of the State Survey Reports, this bed was erroneously correlated with the "Middle War Eagle" (Eagle) Coal, but the results of careful tracing during 1913 in the region between Cedar and War Eagle show the bed mined at the former place to represent a separate and distinct bed belonging 75 to 90 feet lower in the measures at that point. As suggested above under the description of the Little Eagle Coal, it is very probably a "split" off the seam (Little Eagle) cropping 9 feet above the N. & W. Railway grade at Thacker Station. Since it does not represent the "Middle War Eagle" (Eagle), it is herein designated the **Cedar Coal** from the point it was first commercially mined.

Its thickness and stratigraphic position in other portions of Mingo County are exhibited in the special sections of the Kanawha Series given on preceding pages of this Chapter for Maritime Mine, Thacker, Grapevine Mine, Delorme, and Devon. Its approximate area as a minable coal is shown on Figure 20 in Chapter VIII.

The coal is not represented in Logan County, except as it becomes a part of the Little Eagle seam. In southeastern Mingo, its horizon may be readily determined at any point, as it belongs about midway between the Eagle ("Middle War Eagle") and Lower War Eagle coals, the detailed crops of which are outlined on Map II.

Its thickness, character and composition at the old commercial mine at Cedar and at several prospect openings and crop exposures are given on subsequent pages in Chapter VIII, along with an estimate of its minable area and tonnage by magisterial districts.

The Grapevine Sandstone.

Immediately underlying the last coal described at Lick Fork Siding on both banks of Grapevine Creek, Mingo County, and directly above the marine fossiliferous Eagle Limestone and Shale, there occurs a massive, grayish-white, medium grained, micaceous sandstone, ranging in thickness from 30 to 40 feet, and flush with the N. & W. Railway grade at switch-points of the siding. As this stratum has not been previously described, it is herein designated the **Grapevine Sandstone** from the creek last mentioned.

Its thickness and relative position in the rock column are exhibited in the Cedar Section, page 86; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Hughey in Logan County, and for Thacker, Delorme and Devon in Mingo.

In **Logan County,** it appears to be this ledge that has been quarried for building purposes along the C. & O. Railway grade at Peach Creek Station, 2 miles northward from Logan, as shown in the section given at this point on a preceding page under the description of the Little Eagle Coal. Here it is only 15 feet in thickness, 7 feet below 6 inches of Little Eagle Coal, the Cedar evidently having lost its identity in the latter bed.

In **Mingo County,** this sandstone first rises above drainage in ascending Tug Fork at Thacker and from this point it is a prominent cliff-maker along both hillsides of the latter river southeastward to the Mingo-McDowell County Line. It thus aided very materially in tracing the adjacent members of the Kanawha Series in the intermediate region. No quarries were observed on this ledge in Mingo.

The Eagle Limestone and Shale.

The marine fossiliferous Eagle Limestone and Shale of White[24], belonging at its type locality on the Kanawha River 75 to 80 feet below the Eagle Coal and 55 to 60 feet below the Little Eagle seam, is very persistent in the territory of this Report. Its thickness and stratigraphic position are exhibited in the general sections in Chapter IV for Manbar-Man and War Eagle; and in the special sections of the Kanawha Series given on preceding pages of this Chapter for Hughey, Delorme and Devon. Previous to 1913, this marine horizon had not been noted in Logan and Mingo Counties. Its discovery therein aided very materially in the revision of the correlations of members of the Kanawha Series in former State Survey Reports.

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[24] I. C. White, Bull. No. 65, U. S. G. Survey, pp. 140 and 177; 1891; and Vol. II, W. Va. Geol. Survey, p. 593; 1903.

In **Logan County,** Chapmanville District, Reger reports the crop of a limestone that comes at the proper horizon for the Eagle, at an exposure in the public road along Striker Fork of Crawley Creek, 0.3 mile eastward from Yantus, at an elevation of 625′ B., being hard, blocky, and occurring in large lens-shaped boulders in black shale, 210 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal. It was not searched for fossils at this point; hence, it may carry a marine fauna.

The following section was obtained by Hennen and Reger on the north edge of the public road along Trace Fork of Big Creek, 2.3 miles east of Manila and one mile north of the Boone-Logan County Line:

		Feet.	Inches.
Shale, dark....................................		25	0
Sandstone, shaly, fossiliferous, with Pelecypods and Gastropod fossils..........2′ 0″	Eagle Limestone..	3	3
Limestone, dark (841′ L.)....1 3			
Shale, black, with iron ore nodules, to creek bed		30	0

Here it belongs about 220 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal.

One and sixth-tenths miles southeastward, Hennen reports 2 feet of silicious limestone in the edge of the road along Curry Fork of Garrett Fork of Big Creek, one mile northeast of Curry, at an elevation of 885′ B., 225 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal, that should correlate with the Eagle. A search here would very probably reveal marine fossils.

In the same district, Reger collected a sample of the Eagle Shale for analysis and measured a section at an exposure on the west hillside of Guyandot River, immediately west of the mouth of Crawley Creek, the details of which are given on subsequent pages in Chapter IX under "Shale."

In Logan District, Reger collected another sample of this shale for analysis and measured a section at its crop flush with C. & O. Railway grade at Peach Creek Station, 2 miles northward from Logan, the results of which are also found under "Shale" in Chapter IX.

The following section was measured by Reger along the same hillside of Guyandot River, ½ mile due north of the mouth of Crooked Creek:

			Feet.	Inches.
Sandstone, massive, Grapevine			40	0
Shale, dark, sandy	8' 0"	Eagle Limestone and Shale (Elevation 665' B.)	18	0
Sandstone, limy, 0' to	2 0			
Shale dark, to railway grade	8 0			

A careful search here by Reger failed to reveal marine fossils, but it evidently correlates with the Eagle, as it comes about 275 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal.

In Triadelphia District, Hennen reports this limestone and black shale with a marine fossil fauna cropping along the public road on the east side of Guyandot River, ¼ mile north of the mouth of Sandlick Branch, at an elevation of 830′ B. Their thickness and position in the measures at this point are shown in the Manbar-Man Section, page 60. Here the limestone belongs 315 feet below the Campbell Creek (No. 2 Gas) Coal, an interval in harmony with the southeastern expansion of the Kanawha Series from the north border of Chapmanville District.

In the eastern portion of the same district, Hennen measured the following section at the crop of this limestone along the road on Huff Creek, 0.8 mile northwest of Cyclone, 320 feet below the Campbell Creek (No. 2 Gas) Coal, at an elevation of 805′ B.:

	Feet.	Inches.
Sandstone massive, Grapevine	40	0
Shale, black, Eagle	12	4
Limestone, dark gray, lenticular, Eagle	0	8
Shale, black, with marine fossils, Eagle, to Huff Creek	7	0

In **Mingo County,** Magnolia District, southeastward along the rise of the strata, the Eagle Shale first rises above the N. & W. Railway grade at Lick Fork Siding, on the bank of Grapevine Creek, where a sample for analysis was collected and the following section measured by Gawthrop:

					Feet.	Inches.
1.	Sandstone, massive, Grapevine				30	0
2.	Shale, reddish-brown, with iron ore nodules	5'	0"	Eagle Shale	10	0
3.	Shale, bluish-gray	3	0			
4.	Shale, dark gray, to railway grade	2	0			
5.	Concealed					

The chemical composition of the sample from Nos. 2-4, inclusive, of the section is given under "Shale" in Chapter IX. Mr. Gawthrop did not make any search for marine fossils here, but the shale should carry a fauna of this kind, as absolutely the same horizon carries marine fossils in profusion along the N. & W. Railway grade, 1.3 miles southwestward, as exhibited in the Delorme Section, page 133.

The following section was measured by Hennen at the crop of the Eagle Limestone and Shale along the N. & W. Railway grade at the bridge over Tug Fork, 0.4 mile east of Delorme:

				Feet.	Inches.
Coal, Cedar				3	0
Sandstone, massive, Grapevine				30	0
Shale, black, Brachiopod fossils	23'	0"	Eagle Limestone and Shale	49	0
Limestone, dark gray, hard, in lenses 3 to 4' in diameter and 12" thick, no fossils noted, 0' to	1	0			
Shale, black	10	0			
Shale, dark, sandy, with iron ore nodules and many Pelecypod and Gastropod fossils	9	0			
Shale, dark (base, 733' L.)	6	0			
Coal, soft, Little Cedar, 0" to				0	9
Shale, sandy and flaggy, to railroad grade				5	0

Here the top comes 345 feet below the Campbell Creek (No. 2 Gas) Coal.

In the northern portion of Stafford District, it appears to be the Eagle Limestone cropping in lenses in 20 to 30 feet of black shale (Eagle) along the bed of Browning Fork of Horsepen Creek, just above the mouth of the former stream, at an elevation of 935′ B., according to Hennen, 360 to 380 feet below the Campbell Creek (No. 2 Gas) Coal, as exhibited by the structure contours on Map II. No special search was made for fossils, but it is very probable that a marine fauna occurs in the black shale, as it belongs at the proper interval—50 feet—above an opening in the Lower War Eagle Coal (No. 857 on Map II) to correlate with the same fossil horizon found by Hennen along the southeast hillside of Turkey Creek in the southern portion of Stafford District, 0.6 mile northeast of Star Fork, at an elevation of 1233′ L., the War Eagle Section, page 88, showing the top of the Eagle Shale and Limestone as belonging 387 feet below the Campbell Creek (No. 2 Gas), or "Upper War Eagle" Coal.

The Eagle Limestone and Shale, with marine fossils in profusion, was also found by Hennen on the south hillside of Tug Fork in the State of Virginia, 0.3 mile southwest of War Eagle railway station, at an elevation of 1275′ B.

In the small collections made by Hennen from the Eagle Shale along Tug Fork at the points above mentioned, marine fossils of the genera **Chonetes, Allorisma, Leda, Nucula** and **Euphemus** abound, according to W. Armstrong Price of the Survey Staff.

The Little Cedar Coal.

Immediately at the base of the last formation described, 80 feet below the Cedar Coal, and 25 to 40 feet above the Lower War Eagle Coal, there occurs a very pure, soft, gas coal along the N. & W. Ry. grade, 0.4 mile eastward from Delorme, ranging in thickness from 0 to 8 inches, that has not been previously described. Its position in the measures is shown in the section last given under the description of the Eagle Limestone and Shale. In harmony with the rules of geologic nomenclature, it is herein designated the **Little Cedar Coal** from its association close below the Cedar seam. It was not observed at any other point in the two counties. It is self evident that it is too thin to have any economic importance.

The Lower War Eagle Sandstone.

In the southeastern portion of Mingo County, the interval separating the last coal described and the underlying Lower War Eagle Coal is usually occupied by a massive, arenaceous stratum, ranging in thickness from 20 to 30 feet, that has not been previously described. It is herein designated the **Lower War Eagle Sandstone** from its association with the coal of the same name. No quarries on this ledge were observed in the territory of this Report. It is very probably confined to Stafford District, as the measures in this portion of the Kanawha Series thin rapidly to the northwest from the War Eagle region.

The Lower War Eagle Coal.

The Lower War Eagle Coal of White[25], belonging at its type locality on the east hillside of Turkey Creek, 1.5 miles northeast of War Eagle, in Mingo County, according to Hennen, 480 feet below the Campbell Creek (No. 2 Gas) or "Upper War Eagle" Coal, 256 feet below the Eagle ("Middle War Eagle") Coal, and 59 feet below the marine fossiliferous Eagle Shale, has a fair development in the southeastern border of Triadelphia District (Logan County), and in Stafford District and along the southeast edge of Magnolia District (Mingo), the approximate minable area of which is shown on Figure 21 in Chapter VIII.

Its thickness and stratigraphic position are exhibited in the general sections in Chapter IV for Big Creek in Logan County and Cedar and War Eagle in Mingo; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Devon and Glenalum Tunnel. Its crop is outlined in detail on Map II.

The following section was measured by Hennen at the above mentioned type locality for this seam:

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[25] I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 318 and 325; 1908.

				Feet.	Inches.
Coal, gas	0'	4"	Lower War Eagle	3	9
Shale, gray	1	0			
Coal, gas	2	5			

The parting shale is frequently absent and the lower bench often carries layers of splinty coal. For a roof this coal usually has a black, laminated slate, ranging in thickness from 2 to 5 feet, a characteristic feature that aided very materially in tracing the coal in the regions of its best development mentioned above.

Its thickness, structure and composition at several prospect openings, country banks and crop exposures are given on subsequent pages in Chapter VIII, along with an estimate by magisterial districts of its minable area and tonnage.

The Upper Gilbert Sandstone.

At 1 to 10 feet below the last coal described, there belongs a grayish-white, massive, medium-grained and micaceous sandstone, ranging in thickness from 40 to 50 feet in southeastern Mingo County, and being the same ledge that makes the upper of the twin cliffs along the west hillside of Guyandot River, opposite the town of Gilbert, the base of which comes at an elevation of 975' B. As this stratum has not been previously described, it is herein designated the **Upper Gilbert Sandstone** from the latter place, in contradistinction to the lower of the two cliffs last mentioned. Its thickness and stratigraphic position are exhibited in the general sections in Chapter IV for Kermit, Cedar and War Eagle; and in the special sections of the Kanawha Series on preceding pages of this Chapter for Devon and Glenalum Tunnel.

In **Logan County,** it appears to be this sandstone in the southeast portion of Chapmanville District that makes the cliffs along the C. & O. Railway grade, 30 to 40 feet high, at the mouth of Godby Branch of Guyandot River, one mile southeast of Chapmanville, where it is buff colored, massive, fine-grained and micaceous, belonging about 280 feet below the Campbell Creek (No. 2 Gas) Coal. It seems to be this stratum that crops in the railway cut just west of Pecks Mill and for a short distance southeast of the latter place, where it is massive, grayish-white, medium grained and 40 to 50 feet in thickness.

In **Mingo County,** the Upper Gilbert Sandstone first comes above the N. &. W. Railway grade along the southeastward rise of the strata at Vulcan. Slightly over a mile eastward and 100 yards west of Cedar, it is this sandstone that has been quarried flush with railway grade. One-fourth mile eastward its position with reference to the definitely determined Lower War Eagle Coal is shown in the section at Coal Opening No. 839 on Map II, published in Chapter VIII. On up Tug Fork to the Mingo-McDowell County Line, the Upper Gilbert Sandstone is a very prominent cliff maker, a feature that aided very materially in tracing the adjacent members of the Kanawha Series in the intermediate region. It is also a pronounced cliff-rock northwestward from the same line along both valley walls of Guyandot River to where it passes below the latter stream in the southern edge of Triadelphia District, a short distance below the mouth of Sandlick Branch.

Owing to the high percentage of silica it carries, this stratum should crush into sand adapted to the manufacture of concrete, the exposures furnishing an inexhaustible supply. Its horizon can be readily determined, as it follows very closely the same area as outlined on Map II for the crop of the Lower War Eagle Coal.

The Glenalum Tunnel Coal.

In the southwestern corner of Stafford District, Mingo County, a coal, much split up with sandy shales and shaly sandstone, crops at the east portal of the N. & W. Railway tunnel, ¼ mile east of Glenalum Junction, 35 feet below the last sandstone described and immediately over the Lower Gilbert Sandstone, according to Hennen. As this bed has not been previously described, it is herein designated the **Glenalum Tunnel Coal.** A typical section of the seam for this region is shown in the Glenalum Tunnel Section in Chapter VI, page 135. Here, in a total measurement of 29′ 10″ from its top to the bottom, there is only 3′ 6″ of coal.

Its thickness and stratigraphic position in other portions of the Logan-Mingo area are exhibited in the general sections of Chapter IV for War Eagle and Cedar, and in the one for Devon, page 134. As shown on Figure 22 in Chapter VIII, its approximate minable area appears to be confined to the southern border of Triadelphia District (Logan), and to Stafford and the southeast border of Magnolia (Mingo). Northwestward from these localities, it was not recorded in the logs of any of the oil and gas well borings obtained for this locality, and it is very probable that the coal is not represented. In the region of its best development, its horizon may be readily determined at any point, as it belongs 75 to 100 feet below the Lower War Eagle Coal, the detailed crop of which is outlined on Map II.

Its thickness, character and composition at the several country banks, prospect openings and crop exposures in southeastern Logan and Mingo, are given on subsequent pages of Chapter VIII, along with an estimate of its minable area and tonnage by magisterial districts.

The Lower Gilbert Sandstone.

Immediately at the base of the last coal described and 20 to 40 feet below the Upper Gilbert Sandstone, there occurs in southeastern Logan and Mingo Counties a massive, grayish-white, very hard and arenaceous stratum, ranging in thickness from 50 to 80 feet, and being the lower of the two sandstone ledges, 40 feet above drainage, that make the twin cliffs along the west hillside of Guyandot River, opposite Gilbert, as mentioned above under the description of the Upper Gilbert Sandstone. As this stratum has not been previously described, it is herein designated the **Lower Gilbert Sandstone.**

Its thickness, character and stratigraphic position are exhibited in the general sections in Chapter IV for Kermit, Cedar and War Eagle; and in the special sections of the Kanawha Series in preceding pages of this Chapter for Devon and Glenalum Tunnel.

In **Logan County,** along the southwest border of Chapmanville District it appears to be this stratum in conjunction with the Upper Gilbert that crops in the C. & O. Railway cut on the north bank of Guyandot River at the point the latter is intersected by the 82nd Meridian (See Map II), where the following section was measured by Hennen:

	Thickness Feet.	Total Feet.
Coal, Campbell Creek (No. 2 Gas), (2′ 7″)	2.7	2.7
Shale	7.3	10.0
Sandstone, massive, Brownstown	50.0	60.0
Shale and concealed to bench	20.0	80.0
Concealed along steep bluff to bench	145.0	225.0
Concealed along steep bluff	100.0	325.0
Sandstone, massive, grayish-white, pebbly 55′ Shale and concealed 5 Sandstone, massive, grayish-white, to railway grade 5 Upper and Lower Gilbert	65.0	390.0

Southeastward along the Guyandot River, it dips below drainage a short distance above Pecks Mill, again to emerge along the same stream on the southeastward rise of the strata in the southeastern edge of Triadelphia District, about a mile below the mouth of Elk Creek. From the latter point on southeastward, it is a prominent cliff-maker in conjunction with the Upper Gilbert along both valley walls of Guyandot River to the Mingo-Wyoming County Line. The same is true from where it emerges from Tug Fork about one mile below Devon southeastward to the Mingo-McDowell County Line. This sandstone in conjunction with the Upper Gilbert and the Glenalum Tunnel Coal aided very materially in the correlation of the basal members of the Kanawha Series in the localities last mentioned.

The Lower Gilbert Sandstone is noted in the sections published on subsequent pages in Chapter VIII as recorded at Coal Openings Nos. 872-874 and 876.

It is very similar in structure and composition to the Upper Gilbert Sandstone, and like the latter, should crush into sand adapted to the manufacture of concrete. Its long lines of Cliffs along both the Guyandot and Tug Fork should furnish an inexhaustible supply for such purposes.

The Gilbert Coal.

Immediately at the base of the last sandstone described, or frequently separated from it by 25 to 30 feet of sandy shales, there occurs a thin coal, seldom exceeding 12 inches in thickness, that is probably the lowest bituminous formation in the Kanawha Series of West Virginia, as the 130 feet of Dotson Sandstone, given in the War Eagle Section, page 88, appears to correlate with the Nuttall at the top of the New River Series of Fayette County. As this coal has not been previously described, it is herein designated the **Gilbert Coal** from the town of that name near which it crops and in the north edge of which the following section was measured by Hennen:

	Feet.	Inches.
Sandstone, Lower Gilbert, massive, making great cliff	60	0
Shale, dark, sandy, flaggy	30	0
Coal, Gilbert, (820′ B.)	1	0
Sandstone, Dotson?, to river bed, 0.1 mile below mouth of Stafford Branch	20	0

The following section was measured by Hennen down the north hillside of Gilbert Creek, ¼ mile southwest of the town of Gilbert, Mingo County:

	Thickness Feet.	Total Feet.
Lower War Eagle Coal, bench	0	0
Sandstone, massive, Upper Gilbert	55	55
Concealed (holding Glenalum Tunnel Coal)	45	100
Sandstone. massive, Lower Gilbert	50	150
Shale, dark, sandy	25	175
Limestone, silicious (6″)	0.5	175.5
Shale, sandy and dark	14.5	190
Coal, gas, Gilbert (13″)	1	191
Slate and concealed to bed of Gilbert Creek	10	201

It is this coal that was encountered in the Jackson Mounts No. 1 Well (161), in Kentucky, ½ mile southwest of Cedar, at a depth of 232 feet, immediately at the base of the Lower Gilbert Sandstone and top of the Dotson (Wharncliffe) ledge. (See Cedar Section, page 86). Here, it is recorded 6 feet in thickness, but the unreliability of churn drill borings for testing the thickness and character of coal seams is demonstrated by crop exposures of the same bed to the southeast along Tug Fork. Its intervals below the Lower War Eagle Coal at Cedar and its type locality, as shown in the section last given, are 192.5 and 190 feet, respectively. This is corroborative evidence that the Upper and Lower Gilbert Sandstones and adjacent coals were correctly traced from the Gilbert region of Guyandot River southwestward to Tug Fork.

The crop of the Gilbert Coal is exposed along the north hillside of the latter stream, 0.6 mile southeast of Wharncliffe, at an elevation of 980′ B., 670 feet below the horizon of the Campbell Creek (No. 2 Gas) or "Upper War Eagle" Coal, where it is only 6 inches in thickness.

At Wharncliffe, its blossom is exposed along the N. & W. Railway grade, 75 feet above track level. Here, it does not exceed one foot in thickness. It is too thin to be of any economic importance.

MIDDLE POTTSVILLE, OR NEW RIVER SERIES.

The Wharncliffe (Dotson) Sandstone.

As mentioned at the beginning of Chapter IV, the lowest rocks exposed at the surface appear to be in the Middle Pottsville, or New River Series. Their crop as shown on Map II is confined to the valley walls of Guyandot River southeastward from Gilbert to the Mingo-Wyoming County Line and the immediately adjoining region of its tributaries; and the same for Tug Fork southeastward from a point about midway between Glenalum Junction and Wharncliffe to the Mingo-McDowell Line. The Dotson Sandstone of Campbell[26] seems to occupy most of these measures as represented in the territory of this Report, as exhibited in the War Eagle Section, page 88.

The following section was measured by Hennen with aneroid at the crop of this stratum along the N. & W. Railway grade, 0.6 mile S. 30° E. of Wharncliffe:

		Feet.	Inches.
Coal, Gilbert (980′ B.)		0	6
Sandstone, massive......50′ Concealed and shale...... 5 Sandstone, massive.......20	Wharncliffe (Dotson?)	75	0
Concealed		30	0
Shale, dark laminated with limestone concretions, to railway grade		25	0

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[26] M. R. Campbell, Tazewell Folio No. 44, U. S. G. Survey.

On the Virginia side of Tug Fork at War Eagle, the Wharncliffe (Dotson?) Sandstone extends for 130 feet, according to Hennen, above the bed of the river, where it is massive, current-bedded, medium-grained, pebbly and grayish-white in color.

According to Gawthrop, it forms cliffs in conjunction with the Upper and Lower Gilbert Sandstones along Guyandot River near its intersection with the Mingo-Wyoming Line, where about the same thickness is exposed above drainage.

It is barely possible that the base of the Kanawha Series has been placed too low in this Report, and that the Middle Pottsville or New River Series should commence at top with the Upper Gilbert Sandstone. The field work as planned for 1914 in Wyoming and Raleigh Counties should clear up this matter.

No coals were observed in that portion of the series cropping to the surface in the territory of this Report.

PART III.

Mineral Resources.

CHAPTER VII.

PETROLEUM AND NATURAL GAS.

In West Virginia hard sandstone beds, called **sands,** constitute the principal type of oil and gas producing zones, the single exception being the Greenbrier Limestone ("Big Lime" of the drillers). The Big Lime production is confined entirely to the southwestern counties of the State, where this formation is more or less silicious and the immediately underlying Big Injun Sand more or less limy, the oil therefrom being of a dark and heavy grade and not rating so high in the market as "sand" oil. Logan and Mingo Counties are situated in the southwest portion of the State, where the Big Lime, in the present stage of the development of their oil and gas fields, has proved the main gas zone. The following table, from page 388 of the Monongalia-Marion-Taylor Report, exhibits in descending order the stratigraphic position of all the developed oil and gas horizons in West Virginia:

The Oil and Gas Horizons of West Virginia.

Carboniferous	Monongahela Series	Carroll Sand (Uniontown).
	Conemaugh Series	Minshall (Connellsville). Murphy (Morgantown). Moundsville (Saltsburg). First Cow Run (Little Dunkard) Sand (Buffalo). Big Dunkard Sand (Mahoning).
	Pottsville Series	Gas Sand of Marion and Monongalia Counties (Homewood), Second Cow Run of Ohio. Gas Sand of Cairo. Salt Sand of Cairo. Cairo?
	Mauch Chunk Red Shale	Maxton, Dawson, Cairo.
	Greenbrier Limestone	"Big Lime"; not generally productive.
	Pocono Sandstones	Keener Sand and Beckett Sand of Milton. Big Injun Sand. Squaw Sand. Berea Grit.
Devonian	Catskill Red Beds	Gantz Sand. Fifty-Foot Sand. Thirty-Foot Sand. Stray Sand. Gordon Sand. Fourth Sand. McDonald or Fifth Sand. Bayard or Sixth Sand. Elizabeth or Seventh Sand.
	Chemung and Portage	Warran First or Second Tiona, Speechley Sand. No well defined oil or gas horizons yet discovered in West Virginia.

With the exception of the Big Dunkard, all the sands above in the Monongahela and Conemaugh Series pass into the air over the territory of this Report; and all those in the Allegheny and Pottsville, with the possible exception of the Salt, crop to the surface in the southeastern portions of the two counties; and the rest all lie below drainage. The following table gives not only the sequence of the sands in which oil and gas have been encountered, but also the approximate intervals of each in feet below the Campbell Creek (No. 2 Gas) Coal, the "key rock" on which the structure contours on Map II are based. The intelligent use of this table and map should enable the driller to determine the approximate depth at any point in the area a certain sand should be encountered:

Approximate Intervals from Campbell Creek (No. 2 Gas) Coal to Top of Oil and Gas Sands.

Sands.	Along Northwest Border of Both Counties.	Along Line Through Clothier, Logan and Chattaroy.
	Feet.	Feet.
Salt	300	450
Maxton	950	1500
Big Lime	1075	1625
Big Injun	1275	1900
Berea	1700	2400

Owing to the rapid thickening of the Pottsville and Mauch Chunk measures southeastward across the territory of this Report, it is quite evident that the above intervals are only an approximation, and that no specific figures can be given that will hold good over any considerable area extending in a northwest—southeast direction in the two counties.

DESCRIPTION OF SANDS.

In the territory of this Report, the several sands listed in the table on a preceding page for the Devonian Measures have apparently thinned away and only those in the basal divisions of the Carboniferous; viz, Pottsville, Mauch Chunk, Greenbrier Limestone and Pocono, seem to be represented. Oil and gas in quantity worth mentioning have been encountered in only the Salt, Big Lime, Big Injun and Berea Sands. These will now be described briefly in descending order.

The Salt Sand.

In the western portions of Logan and Mingo Counties, a showing of oil and gas is frequently encountered in a formation that appears to correlate with the "Salt Sand" of the northern fields of the State. In the latter region it represents the Upper Connoquenessing Sandstone of the Pottsville Series and has produced there a large amount of both oil and gas, and also salt water. In the area under discussion, the drillers seemingly have correctly correlated the top-most member of the Middle Pottsville or New River Series with the Salt Sand, but no paying wells have as yet been found in this zone, although showings of both oil and gas are reported. It ranges in thickness from 200 to 300 feet, but is sometimes split with one or more shale layers.

The Big Lime.

The "Big Lime," or Greenbrier Limestone of the Mississippian, has thus far proved the most prolific zone in the territory of this Report. It ranges in thickness from 175 to 300 feet. It is the main gas horizon in the wells at Big Creek, Stone Branch and Chapmanville in Logan County; and in the southwestern portion of Warfield District in Mingo. In the first mentioned locality, some of the wells had an initial production of over 10 million cubic feet daily. In the last mentioned region, the John B. Wilkinson No. 2 Well (No. 132 on Map II), according to information given Reger, had an initial daily production of 8 to 10 barrels of black oil. The gas pay generally occurs in the lower half of this formation. The lime itself has become more or less sandy, so that where it leaves off and the true Big Injun Sand of the northern portion of the State begins are often hard to determine. (It is barely possible that the "Big Lime" oil and gas horizon may be the "Keener" of northern West Virginia.—I. C. W.)

The Big Injun Sand.

The Big Injun Sand, belonging immediately below the last formation described and 1275 to 1900 feet below the Campbell Creek (No. 2 Gas) Coal, is one of the most prolific oil and gas zones in the State, and ranks next to the Big Lime in the Logan-Mingo area in gas produced. In the latter region it is frequently much split up with shale and limy layers so that it is difficult to determine the exact point its top begins. Several of the wells in the southwestern portion of Warfield District, Mingo, produce gas from this zone. Showings of oil in this sand are reported in Wells Nos. 123, 131, 136, and 147 on Map II in the same region.

The Berea Grit.

The Berea Sand, sometimes called the "Berea Grit," belonging 650 to 750 feet below the top of the Big Lime and 1700 to 2400 feet below the Campbell Creek (No. 2 Gas) Coal, has also proved a very prolific oil and gas horizon in West Virginia in the counties of Pleasants, Wood, Ritchie, Wirt, Calhoun, Gilmer, Roane, Kanawha, Putnam, Lincoln, Cabell and Wayne. While showings of oil and gas have been encountered in this zone in several of the wells in the territory of this Report, none has yet produced the same in paying quantities. The sand ranges in thickness from 20 to 50 feet.

WELL RECORDS AND PROSPECTIVE AREAS, (LOGAN COUNTY).

In all, 25 wells have been sunk primarily for oil and gas within the boundaries of Logan County, 22 of which produced gas; none, oil; and three were dry holes. Levels were taken on all of these borings while making researches in the field for this Report. Through the courtesy of individuals and corporations, the State Survey was able to obtain the logs of slightly more than half the number, the records of which in many cases are incomplete. These wells have been numbered in conjunction with the Coal Test Borings for publication in the text, the table below, and on Map II, the serial number corresponding in each case. The accompanying table contains the abbreviated logs of 17 wells and also elevations of the top of the hole on 11 other borings, the details of which were not obtainable. Under the column headed "Owner" the following abbreviations are used:

Big Creek Dev	**Big Creek Development Company.**
Bronx Oil	**Bronx Oil Company.**
Castlebrook	**Castle Brook Carbon Company.**
Milton	**Milton Drilling Company.**
Pelham O. & G.	**Pelham Oil & Gas Company.**
South Penn	**South Penn Oil Company.**
United Fuel	**United Fuel Gas Company.**

In the elevation column the letter "B" indicates barometric determinations, checked on nearest U. S. G. Survey spirit-level elevations; the letter "L," spirit-levels; and, in each case, both being expressed in feet above sea level. Depths and thicknesses are also expressed in feet.

Summarized Record of Tests

No. on Map II.	Name of Farm.	Magisterial District.	Owner.	Elevation A. T.
1	A. Allen No. 1	Harts Creek, Lincoln	A. Allen	655B
2	J. Lambert No. 1	Harts Creek, Lincoln	South Penn	700L
3	Wm. Lucas No. 1	Chapmanville	Pelham O. & G.	635B
4	N. B. Mobley No. 2	Chapmanville	Castlebrook	635B
5	A. A. Vance No. 1	Chapmanville	Bronx Oil	640B
6	Robert Varney No. 1	Chapmanville	Bronx Oil	625L
7	N. B. Mobley No. 1	Chapmanville	Castlebrook	640B
8	Laura L. Hager No. 1	Chapmanville	Castlebrook	645B
9	Miller & Harvey No. 3	Chapmanville	Pelham O. & G.	712L
10	Miller & Harvey No. 1	Chapmanville	Pelham O. & G.	645B
11	Miller & Harvey No. 2	Chapmanville	Pelham O. & G.	621L
12	R. E. Lowe No. 1	Chapmanville	Randolph	640B
13	M. D. Stone, No. 1	Chapmanville	Castlebrook	645B
14	A. S. Christian No. 1	Chapmanville	Castlebrook	650B
15	Thomas Conley No. 1	Chapmanville	Castlebrook	650B
16	Jane Ferrell No. 1	Chapmanville	Castlebrook	630B
17	Oscar Ferrell No. 1	Chapmanville	Castlebrook	650B
18	Andrew Fowler No. 1	Chapmanville	Castlebrook	650B
19	David Conley No. 1	Chapmanville	United Fuel	665B
20	Mary Toney No. 1	Chapmanville	—	675B
21	J. E. Peck No. 1	Chapmanville	United Fuel	740B
22	Wm. Tomblin No. 1	Chapmanville	—	775B
23	Fred Riddle No. 1	Chapmanville	—	1055B
24	J. M. Bennett No. 1	Washington, Boone	Weiler Bros	760B
50A	Boone County Coal Corp. No. 1	Logan	Big Creek Dev	808L
76	Wm. Ellis No. 1	Logan	Milton	750B
90	U. S. Coal & Oil Co	Logan	—	756L
97	Cole & Crane No. 1	Logan	South Penn	848L

for Oil in Logan County.

Campbell Creek Coal (No. 2 Gas)		Salt Sand Top.	Big Lime Top	Big Injun Sand Top.	Berea Sand Top.	Total Depth.	Producing Sand and Remarks.	No. on Map II.
Depth Top	Thickness Feet.							
......	......	......	1213	......	......	3261	1,000,000′ gas in Salt..............	1
......	......	......	1352	......	2104	2112	Dry hole..........................	2
(13)	(2)	......	1126	......	......	1308.5	Big Lime gas......................	3
......	......	......	......	......	......	......	Big Lime gas......................	4
......	......	285	1075	......	1846	1872	Big Lime gas show; Berea gas....	5
......	......	275	1020	......	1800	1820	Big Lime gas good; Salt oil show..	6
......	......	......	1120	......	......	1191	Big Lime gas; 5,000,000′ and 450 lb. R. P. in 3″ connection...........	7
......	......	......	1126	......	......	1179	Big Lime gas; 5,000,000′ and 450 lb. R. P. in 3″ connection...........	8
......	......	350	1165	......	......	1316	Big Lime gas, 4,000,000′; Salt oil show; Maxton oil show..........	9
......	......	246	......	......	......	......	Big Lime gas and Salt Sand oil show, 1 to 2 bbls. oil daily...........	10
......	......	280	1017	......	......	1158	Big Lime gas, 4,000,000′...........	11
......	......	......	......	......	......	......	Big Lime gas, 16,000,000′...........	12
......	......	......	1065	1210	......	1216	Big Injun gas, 1,500,000′ and 450 lb. R. P. in 3″ connection; shows oil when blown off.................	13
......	......	......	1040	1255	......	1259	Big Lime gas, 134,000′ and 350 lb. R. P. 2″ connection.............	14
......	......	......	1024	......	......	1119	Big Lime gas 500 lb. R. P..........	15
......	......	......	......	......	......	.....	Big Lime gas, 3″ connection.......	16
......	......	......	1030	......	......	1114	Big Lime gas, 3″ connection; 550 lb. R. P...........................	17
......	......	......	......	......	......	.....	Big Lime gas 2″ connection.......	18
......	......	......	......	......	......	......	Big Lime gas......................	19
......	......	......	......	......	......	......	Dry hole..........................	20
......	......	......	1050	......	1833	2277	Big Lime gas......................	21
......	......	......	......	......	......	......	Light gas; abandoned.............	22
......	......	......	......	......	......	......	Light gas show; abandoned........	23
......	......	......	1337	1637	2105	2705	Dry hole..........................	24
333	4	......	1930	2200	2689	2721	Dry; gas show in Big Lime and Berea	50A
......	......	......	1662	2020	......	2654	Dry hole; gas show in Big Lime and Berea......................	76
......	......	......	......	......	......	......	Dry hole..........................	90
......	......	......	......	......	......	......	Drilling	97

As in previous County Reports, this table furnishes a means of ready reference as to the name, ownership, elevation of well mouth, and name of producing sand, as also the total depth and depth to the most important oil and gas zones. The accurate location of any tabulated well may be readily determined from its serial or map number by first glancing at the name in the table opposite the corresponding number and then referring to the Index for a further description of the boring, the serial number being published in parentheses along with the heading in the text when the complete log is given or special mention of the well is made.

A discussion of the attempts to find oil and gas and the structural conditions and prospects throughout the county will now be taken up by magisterial districts.

Chapmanville District (Logan County).

Chapmanville District occupies the northwestern portion of Logan County and adjoins Boone and Lincoln Counties. Map II shows its area traversed in a northeast-southwest direction by the great Warfield Anticline, and that the axis of the latter fold plunges fairly rapid from the point it enters Logan from Boone County southwestward to where it leaves the district. Only a small portion of the latter area lies on the east side of the arch. Along the western flank of the anticline, the dip of the strata is quite uniform as shown by the structure contours of the Campbell Creek (No. 2 Gas) Coal, there being no pronounced structural terraces. On the eastern side of the fold the dip of the rocks to the southeast is not so regular, as shown by the structural terrace on the headwaters of Crawley Creek, outlined by the wide divergence of the 925 and 975-foot contours of the Campbell Creek (No. 2 Gas) Coal. Of the 25 wells tabulated above for Logan County, 21 were drilled within the boundaries of Chapmanville District. The major portion of these is located in the **Big Creek-Chapmanville Gas Pool** along the Guyandot River on the western slope of the Warfield Anticline. The wells in the latter region will now be discussed in the order of the numbers designating the same on Map II.

William Lucas No. 1 Well (3 on Map II).—This well is located in the north edge of the town of Big Creek, and is a gasser in the Big Lime. It was completed by the Pelham Oil & Gas Company in August, 1911, and its detailed record is published in connection with the Big Creek Section, page 47.

The N. B. Mobley No. 2 Well (4 on Map II) is located just across the road from the well last described and was completed during 1913 by the Castle Brook Carbon Black Company. No data were obtained as to the size of this well, but it is probably a gasser in the Big Lime.

The following is the record of a gas well located at a slightly higher structural level, one mile northeastward. The boring starts flush with the horizon of the Campbell Creek (No. 2 Gas) Coal; hence, the seam at 175 feet in depth probably correlates with the Eagle of the Kanawha Valley:

A. A. Vance No. 1 Well Record (5).

Chapmanville District; on Big Creek, 1.0 mile northeast of Big Creek Station; authority, Bronx Oil Co.; completed Aug. 16, 1910; elevation, 640' B.

	Thickness Feet.	Total Feet.
Unrecorded	20	20
Shale	50	70
Lime	45	115
Shale	60	175
Coal (Eagle)	4	179
Shale	106	285
Salt Sand	605	890
Red rock	20	910
Lime	15	925
Red rock	15	940
Slate	20	960
Sand	60	1020
Slate	7	1027
Lime	23	1050
Sand	5	1055
Slate	20	1075
Big Lime (gas shows, 1150' and 1270')	215	1290
Red rock	85	1375
Slate and shells	90	1465
Sand, Squaw	10	1475
Slate and shells	351	1826
Chocolate brown shale	20	1846
Berea Grit (gas)	22	1868
Slate, to bottom	4	1872

10" casing, 145'; 8¼" casing, 220'; 6⅝" casing, 1027'.

Only shows of gas are reported in the Big Lime in the above well, while more was apparently encountered in the Berea Sand.

The following is the record of a well drilled farther up Big Creek at a much higher structural level. It starts about 100 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal. In this well the Berea Sand was dry, while a good flow of gas is reported from the Big Lime and an oil show in the Salt Sand. The coal at 175′ in the Vance well (5) is missing:

Robert Varney No. 1 Well Record (6).

Chapmanville District; on Big Creek at mouth of North Fork; 1.8 miles east of Big Creek Station; authority, Bronx Oil Co.; completed, Feb. 10, 1911; elevation, 625′ L.

	Thickness Feet.	Total Feet.
Gravel	30	30
Slate	30	60
Lime	15	75
Slate	18	93
Sand	4	97
Shale	178	275
Sand, Salt (water at 280′; oil show, 440′)	176	451
Slate	134	585
Sand and lime	15	600
Slate and sand	5	605
Lime	5	610
Slate and sand	5	615
Sand	180	795
Slate	25	820
Red rock	15	835
Sand	10	845
Slate	5	850
Sand	15	865
Red rock	15	880
Sand	50	930
Slate	3	933
Lime	77	1010
Slate	10	1020
Lime (Big), (good gas, 1127′-1138′)	200	1220
Red rock	20	1240
Sand, Keener	20	1260
Red rock	20	1280
Sand, Big Injun	60	1340
Slate	30	1370
Sand, Squaw	105	1475
Sand and slate	305	1780
Brown shale	20	1800
Berea Grit, to bottom	20	1820

10″ casing, 35′; 8¼″ casing. 182′; 6⅝″ casing. 1118′
Filled well 595′; bottom is now at 1154′.

The wells increase in volume southeastward up the structural slope from Big Creek along the valley of Guyandot River, as is revealed in the following record which begins only 10 feet below the Campbell Creek (No. 2 Gas) Coal:

N. B. Mobley No. 1 Well Record (7).

Chapmanville District; on east bank of Guyandot River, 0.6 mile northwest of Stone Branch; authority, Castle Brook Carbon Black Co.; elevation, 640′ B.

	Thickness Feet.	Total Feet.
Slate and gravel	70	70
Slate	30	100
Sand	15	115
Slate	115	230
Sand, Salt	280	510
Coal, Lower War Eagle	4	514
Sand	456	970
Slate and shells	110	1080
Black lime	10	1090
Slate	10	1100
Little Lime	18	1118
Slate	2	1120
Big Lime, to bottom (gas at 1172′ and 1189′)	71	1191

"Volume of gas, 5,000,000 feet per 24 hours.
"Rock pressure, 450 lbs. to the square inch.
"Well not drilled through Lime."

The 4 feet of coal at 510 feet appears to correlate with the **Lower War Eagle,** or the small seam that crops a few feet above the bed of Mill Creek, northeastward from Pecks Mill.

The following is the record of a well located at a slightly higher structural level that starts 20 feet below the Campbell Creek (No. 2 Gas) Coal. The Lower War Eagle Coal appears in this boring:

Laura L. Hager No. 1 Well Record (8).

Chapmanville District; on east bank of Guyandot River, 0.5 mile northwest of Stone Branch; authority, Castle Brook Carbon Black Co.; elevation, 645′ B.

	Thickness Feet.	Total Feet.
Gravel	40	40
Sand	25	65
Slate	145	210
Sand, Salt	290	500
Coal, Lower War Eagle	4	504
Sand, Lower Gilbert and Dotson	456	960

	Thickness Feet.	Total Feet.
Slate	40	1000
Red rock	60	1060
Black lime	10	1070
Slate	15	1085
Black lime	35	1120
Pencil Cave	6	1126
Big Lime, to bottom (gas at 1172′ and 1179′)	53	1179

"Volume of gas, 5,000,000 feet per 24 hours.
"Pressure (rock), 450 lbs. to the square inch.
"Well not drilled through Lime."

The following is the record of another Big Lime gasser at a still higher structural level that is reported to have had an initial volume of 4,000,000 cubic feet daily. It starts about 30 feet above the Campbell Creek (No. 2 Gas) Coal. The seam at 645 feet belongs 150 feet lower in the measures than the bed (Lower War Eagle) noted in the two records last given and probably correlates with the **Sewell Coal** of the New River Region of the State:

Miller & Harvey No. 3 Well Record (9).

Chapmanville District; on Stone Branch, 0.5 mile northeast of Stone Branch Station; authority, Pelham Oil & Gas Co.; record furnished by J. F. Kent; completed, April 11, 1911; elevation, 712′ L.

	Thickness Feet.	Total Feet.
Surface, dirt and stone	25	25
Quicksand and gravel (6 bbls. water per hour)	30	55
Blue slate	10	65
Sand	10	75
Slate	55	130
Sand	30	160
Black slate	140	300
Sand shell	2	302
Slate	8	310
Lime and slate	40	350
Sand (Salt Sand, top member)	25	375
Slate	25	400
Sand	12	412
Slate	8	420
Sand (water, 425′; can't bail it out; reduced hole at 503′; oil show, 531′)	120	540
Slate	2	542
Sand (2nd oil show, 550′)	14	556
Slate	4	560
Sand (3rd oil show, black, 565′; gas smell)	20	580
Slate	5	585

	Thickness Feet.	Total Feet.
Sand, Nuttall	55	640
Slate	5	645
Coal, Sewell?	5	650
Slate	65	715
Lime	25	740
Slate	3	743
Lime	32	775
Sand	125	900
Slate	10	910
Lime, rotten	15	925
Slate	14	939
Hard lime shell	6	945
Red rock	10	955
Slate	5	960
Lime	10	970
Slate	20	990
Red rock	10	1000
Sand	10	1010
Slate	5	1015
Sandy lime	5	1020
Slate	5	1025
Maxton Sand (quite a good show oil)	20	1045
Slate	30	1075
Lime shell	2	1077
Slate (broke pin off stem at 1080′)	13	1090
Lime	20	1110
Slate	20	1130
Little Lime	20	1150
Slate	15	1165
Big Lime (first gas pay, 1218′; 2nd gas pay, 1280′)	151	1316

"10″, 32-lb. casing left in well, 53′; 6⅝″, 17-lb. casing left in well, 1168′; 2″, 4-lb. tubing left in well, 1311′; packer set at 1184′."

The following is the record of a Big Lime gasser that starts about 40 feet below the Campbell Creek (No. 2 Gas) Coal. A 1 to 2 barrels daily show of oil was encountered in the Salt Sand:

Miller and Harvey No. 1 Well Record (10).

Chapmanville District; on Guyandot River, 0.3 mile west of Stone Branch; authority, Pelham Oil & Gas Co.; elevation, 645′ B.

	Thickness Feet.	Total Feet.
Surface	70	70
Slate, black	150	220
Sand, Salt, (oil, 224′)	16	236
Slate	1	237
Sand	7	244
Slate	2	246

	Thickness Feet.	Total Feet.
Sand, Salt, (oil, 265'-270')	39	285
Coal and slate, **Lower War Eagle**	2	287
Unrecorded	797	1084
Big Lime and unrecorded to bottom	134	1218

Miller and Harvey No. 2 Well Record (11).

Chapmanville District, at mouth of Stone Branch, at Stone Branch Station; authority, Pelham Oil & Gas Co.; record furnished by J. F. Kent; completed, October 13, 1910; elevation, 621.11' L.

	Thickness Feet.	Total Feet.
Surface	20	20
Lime	30	50
Slate	20	70
Sand (water, 10 bailers per hour)	40	110
Slate	40	150
Coal, Eagle	3	153
Sand, Decota	17	170
Slate	45	215
Sand	45	260
Slate	20	280
Sand, Salt, (hole full of water)	260	540
Coal, Sewell	4	544
Slate	56	600
Sand	10	610
Slate	10	620
Salt Sand	215	835
Slate	20	855
Red rock	13	868
Slate	22	890
Red rock	20	910
Slate and shells	60	970
Sand	30	1000
Slate	17	1017
Big Lime (first gas pay, 1137'; 2nd gas pay, 1154')	141	1158

"10" casing left in well, 60'; 8¼" casing left in well, 200'; 6⅝" casing left in well, 1057'; 2" tubing left in well, 1158'.

"Gas, about four million cubic feet."

The above boring starts about 60 feet below the Campbell Creek (No. 2 Gas) Coal; hence, the coal correlations therein noted.

The **R. E. Lowe No. 1 Well (12 on Map II)** is located on the west bank of Guyandot River, immediately south of Stone Branch, and was drilled during 1914 by Randolph, of Huntington. It is reported to have had an initial daily production of 16,000,000 cubic feet from the Big Lime, and is probably the best well in either county. No record or other official information was obtained for this boring.

The following is a brief record of a gasser in the Big Injun Sand, no pay being reported in the Big Lime. The boring starts about 90 feet below the Campbell Creek (No. 2 Gas) Coal:

M. D. Stone No. 1 Well Record (13).

Chapmanville District; 0.3 mile southwest of Kitchen; authority, Castle Brook Carbon Black Co.; elevation, 645′ B.

	Thickness Feet.	Total Feet.
Unrecorded	1065	1065
Big Lime	145	1210
Big Injun Sand, to bottom	6	1216

"Gas at 1210 feet; 1,500,000′ per 24 hours; rock pressure, 450 lbs. to the square inch."

A. S. Christian No. 1 Well Record (14).

Chapmanville District; on north bank of Guyandot River, 0.9 mile west of Chapmanville; authority, Castle Brook Carbon Black Co.; elevation, 650′ B.

	Thickness Feet.	Total Feet.
Slate	40	40
Quicksand	30	70
Slate	30	100
Sand	260	360
Slate	25	385
Sand	375	760
Slate	50	810
Sand	40	850
Slate	130	980
Black lime	50	1030
Slate	10	1040
Big Lime (gas at 1084′)	215	1255
Sand, Big Injun	4	1259

"Volume of gas, 134,000 cubic feet per 24 hours; rock pressure, 350 lbs. to the square inch."

The above boring starts 160 feet below the Campbell Creek (No. 2 Gas) Coal and shows the Quaternary alluvial deposits—represented by the "quicksand" at the beginning of the log—to have a thickness of 40 feet.

Thomas Conley No. 1 Well Record (15).

Chapmanville District; on west bank of Guyandot River, 0.2 mile west of Chapmanville; authority, Castle Brook Carbon Black Co.; elevation, 650′ B.

	Thickness Feet.	Total Feet.
Slate	40	40
Quicksand	30	70
Slate	30	100
Sand	250	350
Slate	25	375
Sand	375	750
Slate	50	800
Sand	40	840
Slate	60	900
Sand	50	950
Slate	20	970
Black lime	45	1015
Slate	9	1024
Big Lime, (gas at 1066′, 1084′, and 1119′), to bottom	95	1119

"Gas pressure (rock), 500 lbs. to square inch. Volume of gas not taken. Not drilled through the Big Lime."

The above boring starts 210 feet below the Campbell Creek (No. 2 Gas) Coal at a higher structural level than the well last given.

The **Jane Ferrell No. 1 Well (16 on Map II)**, located in the north edge of Chapmanville, and owned by the same company, is a Big Injun gasser. No volume or pressure data were obtained for this boring, but the 3″ connections at the well mouth are fair evidence that it ranks along with the other wells in the field.

Oscar F. Ferrell No. 1 Well Record (17).

Chapmanville District; on east side of Guyandot River, 0.4 mile south of Chapmanville; authority, Castle Brook Carbon Black Co.; elevation, 650′ B.

	Thickness Feet.	Total Feet.
Surface	50	50
Sand, Salt	460	510
Slate	110	620
Sand and lime	15	635
Red rock	30	665
Lime shells	15	680
Red rock cave	20	700
Slate	100	800
Lime	60	860

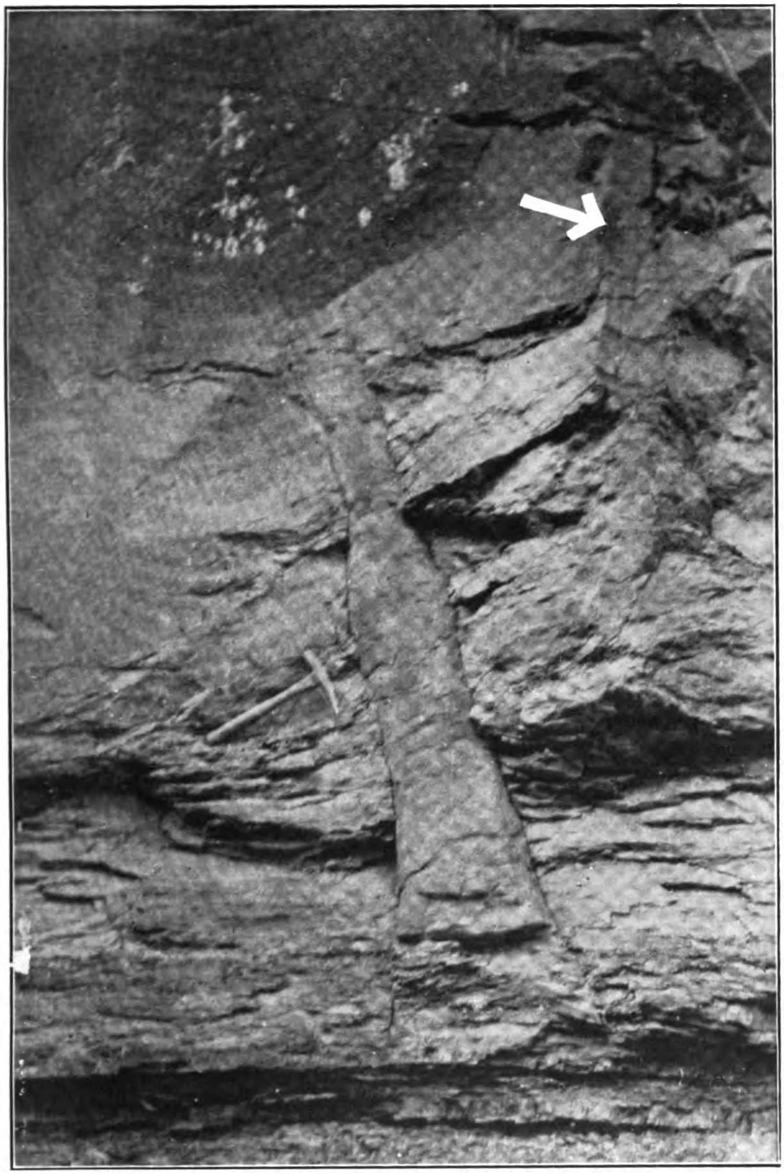

PLATE VI.—Showing fossil tree and cast of another at point of white arrow in Lower Cedar Grove Sandstone; also Alma "A" Coal at bottom; north edge of road, north side of Guyandot River, ¼ mile southeast of Rolfe. (See pages 174-5.)

	Thickness Feet.	Total Feet.
Black slate	30	890
White sand (5 bailers of water per hour)	20	910
Black slate	15	925
Black lime	25	950
Slate	10	960
Black lime.......70' } Big Lime White lime, to bottom....84 }	154	1114

"Gas at 1045', 1060' 1080' and 1082'; Gas pressure (rock), 550 lbs. to square inch; 6⅝" casing, 720'."

The above boring starts about 240 feet below the Campbell Creek (No. 2 Gas) Coal. The 3" connections at the well mouth indicate a good gasser. The record is also given in connection with the Chapmanville Section, page 49.

The **Andrew Fowler No. 1 Well (18 on Map II)**, located on the east bank of Guyandot River, and 0.4 mile south of Chapmanville, is a fair gasser in the Big Lime. No log was obtained for this boring, but the 2" connections indicate a lighter volume than some of those already given.

The **David Conley No. 1 Well (19 on Map II)**, located on the west side of Guyandot River, one mile south of Chapmanville, occupies the highest structural level of any of the wells in this field. It was drilled by the United Fuel Gas Co., and is reported a fair gasser from probably the Big Lime.

The **Mary Toney No. 1 Well (20 on Map II)**, located on the east side of Guyandot River, opposite the mouth of Caney Branch and 0.6 mile northwest of Godby, is a dry hole. No record of the depth reached was obtained.

The following is the log of a Big Lime gasser, just on the east side of the crest of the Warfield Anticline, that apparently opens a new gas pool. The boring starts about 285 feet below the Campbell Creek (No. 2 Gas) Coal:

J. E. Peck No. 1 Well Record (21).

Chapmanville District; on head of Crawley Creek, 0.8 mile southeast of the mouth of Brushy Fork; elevation, 740' B.

	Thickness Feet.	Total Feet.
Unrecorded	134	134
Sand	12	146
Unrecorded	40	186

	Thickness Feet.	Total Feet.
Sand	30	216
Unrecorded	194	410
Sand (water at 520')	266	676
Unrecorded	169	845
Lime	15	860
Unrecorded (water at 905')	190	1050
Big Lime (gas at 1255')	300	1350
Unrecorded	483	1833
Berea Sand	12	1845
Unrecorded to bottom	432	2277

10" casing, 39'; 8" casing, 334'; 6" casing, 1050'.

The **Wm. Tomblin No. 1 Well (22 on Map II),** located in the southwest edge of Chapmanville District, on the head of Hart Creek, 0.9 mile southward from Whirlwind, is reported a very light gasser, and when visited by Reger, during 1913, had been abandoned. No log was obtained.

The **Fred Riddle No. 1 Well (23 on Map II),** located on the extreme head of Hart Creek, 0.5 mile northeast of the common corner of Chapmanville, Logan and Harvey Districts, is reported as having had a showing of gas in some of the sands, but had been abandoned when visited by Reger during 1913. The Survey was not able to obtain any definite information concerning this boring.

Prospective Oil and Gas Areas, Chapmanville District.

A careful study of the structural conditions and the present gas development in Chapmanville District leads to the belief that the gas fields therein from the Big Lime, Big Injun and Berea Sands are the results of accumulations from the oil pools in those zones westward down the structural slope to the vicinity of Branchland and Redwing in Lincoln County. Hence, the chances of finding oil within the district, especially along the western slope of the Warfield Anticline, are problematical, owing to the uniformity of dip and lack of terraces and monoclinal structure. Efforts to open up an oil pool should be confined in this portion of the district to the region immediately northwest of the present developed gas areas. On the east side of the Warfield Anticline, within the boundaries of the district, the terrace structure prevailing on the waters of Pigeonroost Branch of Crawley Creek is quite favorable for oil, should the Big Lime gas in the J. E. Peck No. 1 Well (21 on Map II) not be an accumulation from the Lincoln County oil pools as above suggested.

From the standpoint of natural gas, Chapmanville District probably offers better prospects than any other in the territory of this report. The areas that appear promising for Big Lime or Big Injun Gas, with a chance for Berea, are (1) that, northeastward from the Guyandot River between the 600 and 900-foot structure contours as outlined on Map II to the Logan-Boone County Line; (2) that, southwestward from the same river and roughly between the same contours to the Chapmanville-Harvey District Line; (3), that, along the crest of the Warfield Anticline for a width of two to three miles southwestward from the Guyandot River to the Chapmanville-Logan District Line; and (4), that, lying along the crest of the same fold on the waters of Big Creek and including that portion of the district westward to near the 1025-foot structure contour as outlined on Map II.

Logan District.

A glance at Map II shows Logan District traversed in a northeast-southwest direction by two structural folds; viz, the Warfield Anticline and the Coalburg Syncline, and that almost its entire area lies in the latter Basin. As is revealed in the foregoing table of wells, only three borings have been completed within the district, all of which were non-productive, and another is now drilling. The three completed wells are all located along and near the axis of the deep Coalburg trough, so that the chances of obtaining gas in paying quantity in any of them were very remote. These borings and another in the adjoining area of Boone County will now be discussed in the order of the numbers designating them on Map II.

The following is the record of a well located 2.9 miles northward from Clothier and 3 miles northwestward up the structural slope from the axis of the Coalburg Syncline that gives some valuable data as to the presence or absence of coal seams and sands in this portion of the State, that are directly applicable to the Logan-Mingo area. The boring starts about

30 feet below the Campbell Creek (No. 2 Gas) Coal; hence, the bed at 100-104′ evidently correlates with the Matewan Coal, with the thickness probably exaggerated, as frequently happens in the logs of churn drill borings:

J. M. Bennett No. 1 Well Record (24).

Washington District, Boone County; on east bank of Spruce Fork, 0.2 mile south of Greenview; authority, J. G. Weiler; elevation, 760′ B.

	Thickness Feet.	Total Feet.
Alluvium	19	19
Sand	36	55
Lime	45	100
Coal, Matewan	4	104
Fire clay	4	108
Slate and lime shells	112	220
Sand	100	320
Slate	10	330
Sand	185	515
Brown shale	95	610
Salt Sand	380	990
Slate	30	1020
Lime, black	45	1065
Red rock and lime shells	48	1113
Red rock	25	1138
Sand, Maxton	28	1166
Red rock	42	1208
Lime, black	32	1240
Red rock	32	1272
Sand	65	1337
Lime, Big	300	1637
Big Injun (red) Sand	40	1677
Slate and shells	404	2081
Shale, brown	24	2105
Berea Sand	31	2136
Slate and shells to bottom	569	2705

The above record shows the entire absence of the Gordon group of sands, belonging, in the northern portion of the State, 750 to 900 feet below the top of the Big Injun Sand, as also the absence of the Eagle Coal and the coals of the New River and Pocahontas Series.

The **Boone County Coal Corporation No. 1 Well (50A on Map II)**, located at the mouth of Bend Branch of Spruce Fork, 0.4 mile south of Clothier and almost directly on the axis of the Coalburg Syncline, was drilled during 1913 by the Big Creek Development Company to a depth of 2721 feet, and only light showings of gas were encountered in the Big Lime and the Berea. The detailed log of this well is published in connection with the Clothier-Beech Creek Section, page 50. The well was abandoned as non-productive.

The **William Ellis No. 1 Well (76 on Map II)**, located along the northeast hillside of Guyandot River, one mile east of Logan and the same distance northwestward up the structural slope from the axis of the Coalburg Syncline, was drilled several years ago by the Milton Drilling Company to a depth of 2654 feet without finding either oil or gas in paying quantities. Only showings of gas were encountered in the Big Injun and Berea Sands. The detailed log of this boring is published in connection with the Logan Section, page 55.

The **U. S. Coal & Oil Co. No. 1 Well (90 on Map II)**, located on the west bank of Trace Fork, ¼ mile south of Holden and 2 miles northwestward up the structural slope from the axis of the Coalburg Syncline, was also drilled several years ago and failed to get either oil or gas in paying quantity, although a light flow of gas was encountered in the well. The Survey was unable to obtain the log of this boring or any definite information concerning the same.

The **Cole & Crane No. 1 Well (97 on Map II)**, located on the south bank of Pine Creek, 5.3 miles southeast of Holden and 0.9 mile westward from the mouth of the creek, along the eastern slope of the Coalburg Basin, was still drilling at something over a thousand feet at last reports with a drilling machine instead of the usual derrick and outfit that goes with deep borings in West Virginia. Hence, the completion of the well has been much delayed by the hard Pottsville rocks, although begun in November, 1913.

Prospective Oil and Gas Areas, Logan District.

All the foregoing test wells are ranged along a northeast-southwest line across the central portion of Logan District and all are situated at comparatively low structural levels in the Coalburg Basin, so that they do not give much indication of what might occur higher up the slopes in either half of the district. The apparent absence of water in the Big Lime, Big

Injun and Berea in Wells Nos. 24, 50A, and 76 on Map II, should have permitted any oil, if present at these horizons, to have gravitated down into the last mentioned structural trough, provided, however, that these zones are more or less porous in this region. The results of these tests therefore are rather discouraging from an oil standpoint for a large portion of Logan District. Taking up the prospective oil and gas areas (1) that portion of the district lying along the crest of the Warfield Anticline in the region of Pecks Mill, eastward to the 1000-foot structure contour as outlined on Map II, appears favorable from a structure standpoint for gas in the Big Lime, Big Injun and Berea; (2) that along the crest of the same fold on the headwaters of Mud Fork, for gas in the same sands; and (3), that along the slight structural terrace outlined by the divergence of the 950 and 1000-foot contours of the Campbell Creek (No. 2 Gas) Coal on Map II, between Henlawson and Lake, for oil in the same zones.

The eastern portion of Logan District occupies a high structural level as compared to the Clothier and Logan regions, where showings of gas are reported from the Big Lime, Big Injun and Berea, in Wells Nos. 50A and 76 on Map II; hence, a test drilled on the waters of Garland Fork, Brushy Fork or Laurel Fork of Spruce might open a gas pool in one of these zones. However, prospecting in this region would be attended with great financial risk, since it lies so far east of the developed oil and gas fields of the State, where the usual producing sands have a tendency to become harder, closer-grained, and more or less impermeable to these hydrocarbons. In the event that a test well in this locality proved productive, the structure contours should greatly facilitate the further development of the pool.

Triadelphia District.

Triadelphia District occupies the southeastern portion of Logan County, high up on the eastern slope of the Coalburg Syncline, and the remarks last given above for the eastern portion of Logan District apply with equal force to this area. Its structure, however, is quite favorable for the segregation of any contained oil or gas into pools of commercial value, as a glance at Map II shows sufficient relief for that purpose, the Campbell Creek (No. 2 Gas) Coal ranging in elevation therein from 650 feet above sea level in its western point to over 1,650 feet in the eastern. Not a single well has yet been sunk within its borders to test for oil and gas.

Prospective Oil and Gas Areas, Triadelphia District.

Ever keeping in mind the above conditions and the probability that the genesis of oil and gas in the usual producing zones may never have taken place in this portion of the State, (1) that territory lying along the structural terrace northeastward from Rich Creek between the 850 and 900-foot structure contours to near the head of Mudlick Branch of Buffalo Creek, is structurally favored for oil in the Big Lime, Big Injun and Berea; and (2) that located on the waters of Rich Creek southward from the 900-foot structure contour to the Logan-Mingo County Line, along the nose of a local fold, for gas in the same horizons; (3) the comparatively high structural level occupied by the portion of the district on the headwaters of Buffalo Creek, above Craneco, is much in its favor for gas, especially if there should happen to be an oil pool westward down the slope, but a test here would be attended by considerable financial risk for reasons already given.

WELL RECORDS AND PROSPECTIVE AREAS (MINGO COUNTY).

In Mingo County, gas was first discovered just opposite the town of Warfield, Kentucky, more than 30 years ago and almost twice as many wells have been sunk within its borders for oil and gas as in Logan. In all 43 borings have been drilled, 9 of which were dry holes; 2 produce a small quantity of oil; and the other 32 contained a greater or less quantity of gas. As in Logan, levels were taken on all these borings while gathering data in the field for this Report. The accompanying table—similar to that for Logan on a preceding page—contains the abbreviated logs of 32 borings from Mingo County, and the adjoining region of Lincoln County and Kentucky, as also their tidal elevation, along with elevations and data on 20 other wells, the records of which were not obtainable. As in the Logan table, the borings have been given, at the left margin, a serial number, in conjunction with the Coal Test Borings, and the same number designates the well on Map II. For further particulars, the reader is referred to the explanations accompanying the Logan County Table of Well Records, page 232. Under the column headed "Owner," the following abbreviations are used:

Floyd O. & G.	**Floyd Oil & Gas Company.**
Marrowbone	**Marrowbone Oil & Gas Company.**
Meteor Carbon	**Meteor Carbon Company.**
Ohio O. G. & D.	**Ohio Oil, Gas & Distributing Company.**
Poplar Creek	**Poplar Creek Oil Company.**
Shaw R. & Co.	**Shaw, Reece & Company.**
United Fuel	**United Fuel Gas Company.**

In the elevation column the letter "B" indicates barometric determinations, checked on nearest U. S. G. spirit-level elevations; the letter "L," spirit-levels, in each case both being expressed in feet above sea level. Depths and thicknesses are also expressed in feet.

The accurate location of any tabulated well may be readily determined from its serial or map number by first glancing at the name in the table opposite the corresponding number and then referring to the Index for a further description of the boring, the serial number being published in parentheses along with the heading in the text when the complete log of the well is given or special mention of the boring is made.

As in Logan, the county will now be treated by magisterial districts and a discussion given of the attempts to find oil and gas and the prospects and structural conditions therein.

Harvey District (Mingo County.)

Harvey District occupies the extreme northern portion of Mingo and adjoins Logan, Lincoln and Wayne Counties. Its strata are very much warped and twisted, as a glance at Map II will readily show, since its area is traversed by the Warfield Fault and four structural folds; viz, the Canterbury Syncline and the Doane, Warfield and Laurel Fork Anticlines. Only three wells have been sunk for oil and gas within its borders, and all are located in the eastern edge of the district. These will now be discussed in the order of the numbers designating them on Map II.

The **Guyandot Land Association Well (103 on Map II),** located on the north side of West Fork of Twelvepole Creek, ¼ mile northwest of Dingess, was completed several years ago. A showing of oil was encountered in the upper portion of the Big Lime and gas in the Big Injun. The detailed log of this boring is published in connection with the Dingess Section, page 64. When visited by Reger during 1913, gas was escaping from a 4½" pipe, but the well was not being utilized.

The **Mingo Block Coal Co. Well (104 on Map II),** located 3.2 miles southwest of Dingess and ¼ mile up Lick Branch of Laurel Fork, had been abandoned when visited by Reger during 1913. No log could be obtained for this boring, but a strong pocket of gas must have been encountered, as natives report a pressure sufficient to blow the tools out of the hole. Its depth was not learned.

The **Mingo Block Coal Co. Well (105 on Map II),** located

Summarized Record of Tests

No. on Map II.	Name of Farm.	Magisterial District.	Owner.	Elevation A. T.
103	Guyandot L. A.	Harvey	———	990B
104	Mingo Block Coal Co.	Harvey	———	805B
105	Mingo Block Coal Co.	Harvey	———	715B
106	A. W. Wilson	Lincoln (Wayne)	———	750B
107	Caldwell-Colton	Lincoln (Wayne)	Marrowbone	700B
108	Thos. Stepp Hrs. No. 3	Lincoln (Wayne)	Meteor Carbon	645B
109	Thos. Stepp Hrs. No. 1	Lincoln (Wayne)	Meteor Carbon	614L
110	Thos. Stepp Hrs. No. 2	Lincoln (Wayne)	Meteor Carbon	720B
111	Closterman & Lawson	Warfield	Meteor Carbon	870B
112	H. C. Closterman	Warfield	J. L. Caldwell	750B
113	A. W. Brewer No. 1	Warfield	Fred Prentiss	885B
114	A. W. Brewer No. 2	Warfield	Fred Prentiss	880B
115	H. C. Closterman No. 1	Warfield	Shaw, R. & Co.	1300B
116	L. V. Surtain No. 112	Warfield	United Fuel	675B
117	Burning Creek—Marrowbone Land Co. No. 531	Warfield	United Fuel	705B
118	Rhoda Brewer No. 109	Warfield	United Fuel	628L
119	M. H. Waldron No. 91	Warfield	United Fuel	656L
120	James Brewer No. 470	Warfield	United Fuel	850B
121	M. H. Waldron	Warfield	Shaw, R. & Co.	670B
122	M. H. Waldron	Warfield	Shaw, R. & Co.	665B
123	M. H. Waldron	Warfield	Shaw, R. & Co.	665B
124	H. C. Closterman	Warfield	Meteor Carbon	925B
125	United Fuel Gas Co. No. 98	Warfield	United Fuel	667L
126	H. C. Closterman	Warfield	Meteor Carbon	735B
127	James Brewer No. 446	Warfield	United Fuel	618L
128	Anthony Brewer No. 2	Warfield	Meteor Carbon	619L
129	Anthony Brewer No. 1	Warfield	Meteor Carbon	721L
130	Caroline Brewer No. 105	Warfield	United Fuel	606L
131	John B. Wilkinson No. 1	Warfield	Meteor Carbon	620B

for Oil in Mingo County.

Campbell Creek Coal (No. 2 Gas)		Salt Sand Top.	Big Lime Top	Big Injun Sand Top.	Berea Sand Top.	Total Depth.	Producing Sand and Remarks.	No. on Map II.
Depth Top	Thick-ness Feet.							
......	......	......	1410	1586	......	2116	Big Injun gas; oil show, Big Lime..	103
......	......	......	......	......	......	......	Gas, blew tools out hole, but abandoned	104
......	......	......	......	......	......	......	Dry hole..........................	105
......	......	......	......	......	......	......	Gas	106
150	6	......	1074	1314	1850	1875	Big Lime gas; oil show at 290'....	107
......	......	......	......	......	......	......	Big Lime gas......................	108
......	......	......	......	1280	......	1400	Big Lime gas......................	109
......	......	......	......	......	......	1607	Big Lime gas......................	110
......	......	......	......	......	......	(2041)	Dry hole..........................	111
......	......	......	......	......	......	......	Gas, light; abandoned.............	112
......	......	......	......	......	......	(1600)	Dry hole..........................	113
......	......	......	......	......	......	......	Dry hole; oil show, 828'; just through Big Lime...............	114
......	......	......	......	......	......	......	Dry hole..........................	115
......	......	......	1206	1320	1725	......	Big Injun gas, 1,411,600'; 375 lb. R. P..........................	116
......	......	......	1440	1635	2185	2303	Big Lime gas; Gantz gas; Berea oil show.......................	117
......	......	......	1135	......	......	1513	Big Lime gas, 1,500,000'; Maxton gas, 400,000'....................	118
......	......	......	......	......	......	1520	Big Lime gas, 962,000'............	119
......	......	......	1292	1550	2080	3245	Gas, 67,000'......................	120
......	......	......	......	......	......	......	Light gas.........................	121
......	......	......	......	......	......	......	Light gas.........................	122
......	......	......	......	......	......	......	Big Lime gas; Big Injun oil show..	123
......	......	735	1408	1603	2131	2163	Big Lime gas; show Big Injun gas..	124
......	......	......	1135	......	......	1585	Big Injun gas.....................	125
......	......	......	......	......	......	......	Gas	126
......	......	......	1085	1340	......	1410	Gas	127
......	......	422	1096	1296	......	1511	Big Lime and Big Injun gas.......	128
110	3	......	1235	1415	......	1604	Big Injun gas, 2,300,000'; 245 lb. R. P..........................	129
......	......	......	......	......	......	......	Gas, 198,000'.....................	130
......	......	......	1080	1310	......	1502	Big Lime gas and Big Injun gas, 2,587,000'; Big Injun oil.........	131

Summarized Record of Tests for

No. on Map II.	Name of Farm.	Magisterial District.	Owner.	Elevation A. T.
132	John B. Wilkinson No. 2	Warfield	Meteor Carbon	700B
133	M. H. Waldron (Neighbert)	Warfield	Shaw, R. & Co	610B
134	James Vinson No. 447	Warfield	United Fuel	800B
135	James Vinson No. 101	Warfield	United Fuel	713L
136	James Vinson No. 479	Warfield	United Fuel	1180B
137	Hiram Stepp No. 409	Warfield	United Fuel	1200B
138	Hiram Stepp No. 327	Warfield	United Fuel	665B
139	Berger Hrs. No. 67	Martin Co., Ky	United Fuel	614L
140	Berger Heirs	Martin Co., Ky	United Fuel	620B
141	York & Radcliff	Martin Co., Ky	———	625B
142	John Dempsey Hrs. No. 88	Warfield	United Fuel	622L
143	McCormick, Dangerfield & Davis No. 89	Warfield	United Fuel	600B
144	McCormick, Dangerfield & Davis No. 99	Warfield	United Fuel	687L
145	McCormick, Dangerfield & Davis No. 103	Warfield	United Fuel	744L
146	Jacob Beach No. 547	Warfield	United Fuel	1212L
147	McCormick, Dangerfield & Davis No. 90	Warfield	United Fuel	619L
148	Aaron Stepp No. 1	Warfield	Ohio O. G. & D	685L
149	Harry Chafin No. 1	Warfield	Ohio O. G. & D	860B
150	Burning Creek—Marrowbone Land Co. No. 1	Warfield	Ohio O. G. & D	625B
151	Burning Creek—Marrowbone Land Co. No. 2	Warfield	Ohio O. G. & D	760B
152	Burning Creek—Marrowbone Land Co. No. 3	Warfield	Ohio O. G. & D	935B
160	Buffalo Land Co. No. 1	Lee	Floyd O. & G	700B
161	Jackson Mounts No. 1	Pike Co., Ky	Poplar Creek	747L

Oil in Mingo County.—Continued.

Campbell Creek Coal (No. 2 Gas)		Salt Sand Top.	Big Lime Top	Big Injun Sand Top.	Berea Sand Top.	Total Depth.	Producing Sand and Remarks.	No. on Map II.
Depth Top	Thickness Feet.							
......	......	......	1117	1365	......	1558	Big Lime and Big Injun gas; Big Lime black oil, 8-10 bbls..........	132
......	......	......	1065	......	1885	2226	Berea oil show; Big Injun gas light	133
......	......	......	1270	......	......	1684	Big Injun gas, 1,360,000'............	134
......	......	......	1217	......	......	1712	Big Lime gas, small; 2½ bbls. oil	
......	......	......	1557	......	2228	2405	Big Lime gas; Salt Sand gas.....	135
							in Big Injun, at 2008'.............	136
......	......	......	1693	1895	2446	2463	Big Lime gas......................	137
......	......	......	......	......	......	......	Gas	138
......	......	......	1100	1290	......	1430	Big Injun gas; 1,909,000'...........	139
......	......	......	......	......	......	......	Gas, light.........................	140
......	......	......	......	......	......	......	Good gas..........................	141
......	......	......	1075	......	......	1302	Big Lime gas; 2" connections......	142
......	......	......	......	......	......	......	Big Lime gas, 2,658,000'............	143
......	......	......	1188	......	1928	3035	Big Lime gas, good.................	144
160	3	......	1251	1480	......	1607	Big Lime gas; Big Injun oil show, 1490'	145
583	3	......	......	......	......	......	Drilling at 580'.....................	146
......	......	......	......	......	......	1350	Big Lime gas, 242,000'; Big Injun oil	147
......	......	......	......	......	......	......	Dry hole..........................	148
......	......	......	......	......	......	......	Gas well, good; shut in and tubed, 2"	149
245	5	......	1322	1496	2064	2181	Big Lime gas, 1,750,000'; Berea oil show	150
......	......	......	......	......	......	......	Big Lime gas, good................	151
......	......	......	1689	1872	2416	2515	Dry hole; oil show in Berea.........	152
......	......	......	1730	2007	2544	2876	Big Injun gas, 250,000' daily.......	160
......	......	......	......	......	......	2967	Dry hole	161

on the east bank of Laurel Fork, in the southern point of Harvey District, 1.5 miles eastward from Canterbury, had been abandoned as non-productive when visited by Reger during 1913, but a showing of gas was reported by the natives. No log or definite information could be obtained for this boring.

Prospective Oil and Gas Areas, Harvey District.

It is quite evident that the information in the way of present development is very meager in this district on which to outline territory favorable for oil or gas. From a structural standpoint (1) that territory lying along the nose of a slight local anticline, on the waters of East Fork of Twelvepole Creek, above the mouth of Trace Branch, appears favorable for gas in the Big Lime, Big Injun and Berea; (2) that, along the crest of the Warfield and Doane Anticlines, for gas in the same horizons; (3) that, on the structural terrace outlined on Map II by the wide divergence on the 650 and 700-foot contours of the Campbell Creek (No. 2 Gas) Coal, on the waters of West Fork of Twelvepole, for oil in the same sands; and (4) that, along the crest of Laurel Fork Anticline on the waters of Laurel Fork, above the mouth of Panther Branch, for gas in the same zones. The further development of any pool opened by a successful test on the foregoing areas should be greatly aided by the structure contours on Map II.

Warfield District (Mingo County)

Warfield District lies immediately southwest of Harvey District and adjoins Lincoln County and the State of Kentucky. As in the district last described, its strata are very much warped and twisted. A glance at Map II shows its area traversed by the Warfield Fault, the Doane and Warfield Anticlines, and the Burning Creek and Coalburg Synclines. Of the 43 wells bored for oil and gas in Mingo County, 39 are located within the boundaries of this district, mostly in the gas field developed in the western corner. These borings will now be discussed in the order of their numbers in the foregoing table and on Map II.

The **Closterman & Lawson Well (111 on Map II)**, located in the northwestern edge of Warfield District on the head of Left Fork of Marrowbone Creek and 0.7 mile due north of Spaulding, was drilled by the Meteor Carbon Co. The log of this boring was not obtained, but according to information furnished Reger by a native, it penetrated to a depth of 2041 feet, or about 100 feet below the Berea Sand, a showing of black oil being encountered at a depth of 700 to 800 feet, and also a light showing of gas, the horizon of which was not known. The oil show was probably in the Maxton.

The **H. C. Closterman Well (112 on Map II)**, located 1.2 miles east of the well last described, along the south hillside of Jennie Creek, was drilled by J. L. Caldwell of Huntington. When visited by Reger during 1913, this boring had been plugged and abandoned, but gas was burning at several points where it was escaping from the ground near the well mouth. No log was obtained of this boring, but according to A. J. Spaulding, it penetrated to a depth of 1800 feet, and, as it starts about 100 feet above the horizon of the Campbell Creek (No. 2 Gas) Coal, it should have passed through the Berea Sand. The gas pay is reported at a depth of 1200 to 1300 feet, probably in the basal portion of the Big Lime. A showing of oil was struck sufficient to cause it to flow down the creek for some distance. The horizon where it was found is not known.

The **A. W. Brewer No. 1 Well (113 on Map II)**, located in the northern edge of Warfield District, one mile up Messer Branch of Marrowbone Creek and on the Warfield Fault as outlined on Map II by Reger, was drilled to a depth of 1600 feet, or just through the Big Injun. The well had been abandoned when visited by Reger during 1913, who reports the 6"-casing still in the boring and water flowing from the well mouth, with a slight smell of gas. Although located near the crest of the Warfield Anticline, the territory in the immediate region of this boring has probably long ago been drained of any contained gas through the fissure resulting from the last mentioned Fault.

The **A. W. Brewer No. 2 Well (114 on Map II)**, located a few feet south of the last well described, was drilled through the Big Lime by the same party on account of an accident at the latter boring, according to information given Reger, who reports the rocks dipping southeast at this point at an angle of 15 degrees with the horizontal. The Survey was unable to obtain the log of this well. A showing of oil was reported at a depth of 828 feet, about 630 feet below the horizon of the Campbell Creek (No. 2 Gas) Coal, that was evidently in one of the sandstone members at the base of the Pottsville Series.

The **H. C. Closterman No. 1 Well (115 on Map II),** located 2.4 miles southwest of the two borings last described, nearly on the axis of the Warfield Anticline, as outlined on Map II, was drilled by Shaw, Reece & Co., of Lima, Ohio, resulting in a dry hole. The Survey was unable to obtain the log or any definite information concerning this boring. Reger reports the 6″-casing still in the well during October, 1913, with no smell of gas therefrom. Its proximity to the Warfield Fault—less than one-half mile, as outlined on Map II—probably accounts in no small measure for its non-productive character, for reasons mentioned above under No. 113 on Map II.

In the southwestern portion of Warfield District, the attempts to find gas in paying quantities have been much more successful. Several records will now be given from what is at present the largest developed pool within the territory of this Report, the gas being encountered in the Big Lime and the Big Injun Sand.

The following is the record of a Big Injun Sand gasser:

L. V. Surtain No. 112 Well Record (116).

Warfield District; on Marrowbone Creek, ½ mile southeast of mouth of Pickletub Branch; authority, United Fuel Gas Co.; completed, January 15, 1906; elevation, 675′ B.

	Thickness Feet.	Total Feet.
Drift	43	43
Sand (abundant water)	17	60
Coal, Alma	5	65
Sand	42	107
Shale, brown	31	138
Sand, white, streaked with coal	62	200
Shale	50	250
Sand	50	300
Lime shells	40	340
Sand, blue, streaked with coal	60	400
Sand, white	45	445

	Thickness Feet.	Total Feet.
Coal, broken shells	20	465
Sand, bluish white	49	514
Shale	6	520
Sand, hard and white, Salt	105	625
Shells, lime, black and hard, (little salt water, 635')	15	640
Lime, hard	20	660
Lime, soft, black	90	750
Shells, hard	10	760
Sand, hard, Maxton (salt water at 975'; 2 bbls. per hour)	230	990
Lime, gray, very hard	60	1050
Sand, (coal at 1200')	156	1206
Lime, gray (salt water at 1220', 1 bbl. per hour)	34	1240
Lime, light gray, hard	32	1272
Lime shells	8	1280
Slate, blue	3	1283
Slate, brown	7	1290
Slate, blue	2	1292
Lime, whitish (6" casing, 1316')	28	1320
Sand, white	40	1360
Red rock	10	1370
Red and blue rock, mixed	10	1380
Slate, blue	5	1385
Lime shells	10	1395
Slate, blue	10	1405
Slate, red	13	1418
Lime	4	1422
Red rock	8	1430
Slate and Pencil Cave	45	1475
Lime (Greenbrier) "Big Lime"	210	1685
Shells, soft lime	15	1700
Slate, soft, sand and lime	25	1725
Sand, blue, slate, Big Injun (gas at 1742')	62	1787
Slate, dark	25	1812

"Reamed from 1300' to 1386'; 10" hole. Reamed from 1386' to 1475'; 3" anchor and 2" tubing above piping; 6¼", 8" and 10" casing pulled. 13" drive pipe left in. The rock pressure of the well when shut in in one hour was 370 lbs., and open flow before being shut was 1,411,600 cubic feet per day. Packer, 200' from bottom."

The following is the record of a boring that starts, according to Reger, slightly over 100 feet above the Campbell Creek (No. 2 Gas) Coal:

Burning Creek-Marrowbone Land Co. No. 531 Well Record (117).

Warfield District; on Pickletub Branch, 3.3 miles N. 80° E. of Kermit; authority, United Fuel Gas Co.; commenced July 3, 1913; completed, September 11, 1913; elevation, 705' B.

	Thickness Feet.	Total Feet.
Unrecorded (water at 45')	50	50
Sand	10	60
Unrecorded	15	75
Coal, (Alma)	3	78
Unrecorded	202	280
Coal, Eagle?	2	282
Lime (water at 290')	83	365
Sand	35	400
Coal	4	404
Sand	76	480
Lime	20	500
Sand	220	720
Salt Sand (hole full of water at 875')	240	960
Lime	15	975
Unrecorded	70	1045
Lime	80	1125
Unrecorded	60	1185
Red rock	15	1200
Black lime	85	1285
Maxton Sand (water at 1290')	25	1310
Lime shells	65	1375
Break	25	1400
Little Lime	30	1430
Pencil Cave	10	1440
Big Lime (gas at 1577')	190	1630
White slate	5	1635
Big Injun Sand	15	1650
White slate	30	1680
Shells	20	1700
White slate	225	1925
Shells	15	1940
White slate	20	1960
Shells	30	1990
Slate	8	1998
White slate	177	2175
Shells	10	2185
Berea Grit (oil show)	20	2205
White slate	5	2210
Shells	19	2229
Slate	6	2235
Shells (gas at 2253')	50	2285
Brown shale to bottom	18	2303

"Gas calculated, 387,000 cu. ft."

The gas showing at 2253 feet probably belongs at the horizon of the Gantz Sand of the northern portion of the State.

The usual gas zones below and including the Big Lime appear to be non-water-bearing in this region.

The following is the record of a well, starting 25 to 30 feet above the Campbell Creek (No. 2 Gas) Coal, that is a fair gasser from the Maxton and Big Lime, although located very near the Warfield Fault:

Rhoda Brewer No. 109 Well Record (118).

Warfield District; on Marrowbone Creek, 0.7 mile southeast of mouth of Buck Branch; authority, United Fuel Gas Co.; commenced July 15, 1905; completed, August 24, 1905; elevation, 628′ L.

	Thickness Feet.	Total Feet.
Drift	30	30
Reddish brown sand	10	40
Light blue sand (water supply)	10	50
Sand, white	20	70
Shells, sandy	6	76
Shells, dark	64	140
Slate, dark	20	160
Slate, light	10	170
Slate and shells, sandy	40	210
Slate, blue	15	225
Sand, white	45	270
Slate, black	30	300
Slate, light	60	360
Sand, gray	40	400
Sand, and shale, dark	90	490
Salt Sand, hard and sharp	120	610
Slate, black, hard	17	627
Sand, white, hard	53	680
Slate, black	16	696
Coal	6	702
Slate, black	8	710
Sand, white	120	830
Shells, brown	45	875
Coal	5	880
Slate	3	883
Coal	7	890
Sand	10	900
Shells	100	1000
Sand ....55′ Sand, hard, close, brown, (gas. 400,000′ daily)....12 } Maxton	67	1067
Slate	5	1072
Pencil Cave	10	1085
Sand, red and black, not hard	53	1135
"Niagara" Lime, not hard, ("Big Lime")	245	1380
Shells and lime (1,500,000′ gas daily)	90	1470
Shells, hard	5	1475
Shale, dark and sandy	38	1513

10″ casing, 225′; 8¼ casing, 1055′.

The thick coal seams recorded at 696′, 875′ and 883′ in the record evidently belong near the base of the Pottsville in probably the New River Series. At this far removed locality any attempt to correlate these beds would be merest guess work. They are quite local in their deposition, as the two borings last given fail to note any of them. Owing to the proximity of the well to the Warfield Fault, it is barely possible that these bituminous deposits may represent Grahamite[1], a mineral much resembling coal that occurs in a deep vertical fissure at Ritchie Mines, Ritchie County, and being an oxidized product of petroleum.

The following is a very meager record furnished by the owners of a gas well that starts, according to Reger, 25 to 30 feet above the Campbell Creek (No. 2 Gas) Coal. The gas pay is evidently in the basal portion of the Big Lime:

M. H. Waldron No. 91 Well Record (119).

Warfield District; on south side of Marrowbone Creek. 0.5 mile southeast of mouth of Buck Branch; authority, United Fuel Gas Co.; elevation 656′ L.

"47′ 10″ drive pipe; 245′ 8¼″ casing; 1100′ 6¼″ Ch. casing; gas got at 1250′; total depth, 1520′.

"Gas calculated to be 962,000 cu. ft. daily."

The following is the record of what is said to be the deepest well drilled in the Kermit field. It penetrated 1060 feet below the Berea Grit without finding any sands and probably stopped only a few feet above the Corniferous Limestone, which, according to the Central City Well of Cabell County—see pages 495-496 of Volume I(A)—belonged there only 1005 feet below the Berea. The first mentioned well starts about 200 feet above the Campbell Creek (No. 2 Gas) Coal. The horizon at which the light gas pay was encountered was not given in the well log, but the chances are that it was in the Big Lime:

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[1] I. C. White, Vol. X, Geological Society of America, pp. 277-284; 1899; and Vol. I (A), W. Va. Geol. Survey, p. 404; 1904.

James Brewer No. 470 Well Record (120).

Warfield District; on Buck Branch, 0.8 mile southwest of Spaulding; authority, United Fuel Gas Co.; completed, January 6, 1913; elevation, 850′ B.

	Thickness Feet.	Total Feet.
Unrecorded	115	115
Coal, Alma	5	120
Unrecorded	115	235
Sand	165	400
Sand	240	640
Sand	120	760
Slate and shells	95	855
Sand	65	920
Slate and shells	140	1060
Lime shells	50	1110
Red rock	70	1180
White slate	20	1200
Red rock	35	1235
White slate	15	1250
Pencil Cave	10	1260
Shells	32	1292
Big Lime	258	1550
Big Injun Sand	18	1568
Unrecorded	22	1590
Slate and shells	90	1680
White slate	200	1880
Lime shells	40	1920
Black slate	80	2000
Shells	60	2060
Black slate	20	2080
Berea Grit	105	2185
Black slate	85	2270
Slate and shells	40	2310
White slate	70	2380
Slate and shells	140	2520
Black slate	205	2725
Slate	100	2825
Shells	5	2830
Slate	160	2990
Shells	10	3000
Black shale	25	3025
Lime shells	5	3030
Slate	45	3075
Black slate	15	3090
White slate	110	3200
Lime shells	5	3205
Slate	20	3225
Black slate to bottom	20	3245

"All casing pulled except 10″; tried to plug hole; could not get gas shut off and had to tube with 3″ casing and close well in; 67,000 cu. ft. daily."

The **M. H. Waldron Well (121 on Map II),** located ¼ mile up Buck Branch of Marrowbone Creek and 2½ miles northeast of Kermit, was drilled by Shaw, Reece & Co. The Survey was unable to obtain the log or definite official information concerning this boring or of the two following wells drilled by the same company. When visited by Reger, during 1913, gas was burning from the mouth of the 6″-casing with a flame 5 feet in height, and the well had been abandoned. A ten-barrel showing of black oil from the Big Lime was also reported. The horizon the gas was encountered and the total depth of the boring were not learned.

The data concerning the **M. H. Waldron Wells Nos. 122 and 123 on Map II,** located immediately northwest of the last boring described and along the west hillside of Buck Branch, are even more meager than that given above for No. 121, all three being drilled by the same company. No. 122 was a very light gasser, while No. 123 is reported as having a 15-barrel daily showing of green oil from the Big Injun Sand. The information, however, is unofficial and not much dependence can be placed in the same.

The following is the record of a boring that shows gas at 3 different zones; viz, Maxton Sand, Big Lime, and about the horizon of the Squaw Sand. The well starts about 310 feet above the Campbell Creek (No. 2 Gas) Coal:

H. C. Closterman Well Record (124).

Warfield District; west hillside of Left Fork, 0.7 mile southwest of Spaulding; authority, Meteor Carbon Co.; commenced August 12, 1912; completed, September 15, 1912; elevation, 925′ B.

	Thickness Feet.	Total Feet.
Gravel	28	28
Black slate	77	105
Sand	40	145
Slate	45	190
Sand	60	250
Slate	60	310
Coal (Campbell Creek, No. 2 Gas)	4	314
Slate	86	400
Sand	85	485
Slate	100	585
Sand	140	725
Slate	10	735
Sand, Salt (salt water, 880′)	260	995
Shells and slate	125	1120
Red rock and shells	107	1227

	Thickness Feet.	Total Feet.
Slate and shells	133	1360
Sand, Maxton (gas show, 1370')	18	1378
Black lime	30	1408
Big Lime (gas show)	190	1598
Red rock	5	1603
Sand, Big Injun	24	1627
Shells and slate (gas at 1805') (bridged at 1820')	193	1820
Slate	311	2131
Berea Sand, badly broken, to bottom	32	2163

The following is the record of a well that starts, according to Reger, about 30 feet above the Campbell Creek (No. 2 Gas) Coal. The gas pay comes in a brown shale division of the Big Injun Sand:

United Fuel Gas Co. No. 98 Well Record (125).

Warfield District; on northwest bank of Left Fork, 0.7 mile southwest of Spaulding; authority, United Fuel Gas Co.; elevation, 667' L.

	Thickness Feet.	Total Feet.
14" drive pipe	32	32
Blue slate	90	122
Black slate	4	126
White sand	54	180
Brown slate	40	220
White sand	4	224
Lime	26	250
Black lime	30	280
Blue shells and lime	90	370
Brown shale	83	453
White sand and lime	22	475
Salt Sand	163	638
Slate	4	642
Black lime	63	705
Brown and white slate	160	865
Red rock	37	902
Blue lime and shells	45	947
Blue and red rock, alternating	40	987
Red rock	13	1000
Red and blue shale with lime	50	1050
Reddish brown sand	10	1060
Red and blue shale	45	1105
Dark gray sand, very close. Maxton (soft mineral water, 3 bbls. per day at 1120')	30	1135
Unrecorded (**Big Lime horizon**)	221	1356
Red sand, Big Injun	44	1400
Brown shale (gas, 1427')	27	1427
Black shale, very hard	6	1433
Blue shale	82	1515
Slate, cut like sand	4	1519
Dark shale	66	1585

The **H. C. Closterman Well (126 on Map II)**, located along the west hillside of Left Fork of Marrowbone Creek, 1.2 miles southwest of Spaulding, was drilled by the Meteor Carbon Co. It is a gasser from probably the Big Lime. The Survey was unable to obtain its log or any definite information concerning the boring.

The ten following records are from wells along the western slope and near the crest of the Warfield Anticline:

James Brewer No. 446 Well Record (127).

Warfield District; on the north side of Marrowbone Creek, at mouth of Left Fork. 1.5 miles southwest of Spaulding; authority, United Fuel Gas Co.; commenced Nov. 5, 1912; completed, Dec. 10, 1912; elevation, 618′ L.

	Thickness Feet.	Total Feet.
Gravel	45	45
Slate	50	95
Coal, Eagle?	5	100
Slate	105	205
Sand	25	230
Slate	10	240
Sand	40	280
Slate	135	415
Salt Sand	195	610
Slate	10	620
Sand	135	755
Coal, Sewell?	3	758
Slate	72	830
Sand	30	860
Red rock	30	890
Lime	15	905
Red rock	15	920
Lime	12	932
Red rock	58	990
Slate	5	995
Lime	11	1006
Slate	12	1018
Lime	7	1025
Red rock	45	1070
Sand	15	1085
Little Lime 36′ Big Lime 174 } Big Lime	210	1295
Red rock	35	1330
Slate	10	1340
Sand, Big Injun	63	1403
Slate, to bottom	7	1410

The above boring starts flush with the crop of the Campbell Creek (No. 2 Gas) Coal. The coal bed at 755′ in depth is evidently one of the New River seams and may correlate with the Sewell.

Anthony Brewer No. 2 Well (128).

Warfield District; on south side of Marrowbone Creek, opposite mouth of Left Fork, 2.0 miles northeast of Kermit; authority, Meteor Carbon Co.; commenced March 20, 1913; completed, April 16, 1913; elevation, 619′ L.

	Thickness Feet.	Total Feet.
Gravel, brown	30	30
Slate, white (hole full of water at 90′)	175	205
Sand, white	10	215
Clay, yellow	5	220
Sand, white	5	225
Slate, black	10	235
Lime, white	15	250
Slate, black (oil and gas show, 258′)	8	258
Sand, gray	5	263
Slate, black	159	422
Salt Sand, white (gas at 483′)	262	684
Slate, black	2	686
Sand, white	55	741
Slate, white	107	848
Red rock	40	888
Shells, white	12	900
Red rock	15	915
Slate, white	30	945
Red rock	6	951
Slate, black	19	970
Red rock	35	1005
Slate, black	41	1046
Sand, gray	20	1066
Lime, black	22	1088
Slate, black	8	1096
Lime, white, (Big Lime) (gas at 1290′)	200	1296
Sand, red, Big Injun	30	1326
Sand, gray	29	1355
Slate, white (gas at 1495′)	140	1495
Lime, gray	16	1511

The above boring starts 5 feet above the Campbell Creek (No. 2 Gas) Coal and fails to record either of the two coals noted in log last given for No. 127. Gas is reported at 4 separate horizons.

Anthony Brewer No. 1 Well Record (129).

Warfield District; on south side of Marrowbone Creek, 0.2 mile south of mouth of Left Fork, and 1.9 miles northeast of Kermit; authority, Meteor Carbon Co.; commenced Nov. 29, 1912; completed, Dec. 20, 1912; elevation, 721' L.

	Thickness Feet.	Total Feet.
Yellow clay	30	30
White slate	25	55
Sand	55	110
Coal, Campbell Creek (No. 2 Gas)	3	113
Slate	37	150
Sand, white	20	170
Slate black	40	210
Coal, Eagle ? (3 bailers of water)	3	213
Slate	42	255
Lime, white	10	265
Slate, black	25	290
Sand, white	40	330
Slate, black	60	390
Lime, black	15	405
Slate, black	105	510
Sand, white	20	530
Slate	5	535
Salt Sand (gas show, 675') (increase of water to 7 bailers at 700')	315	850
Slate, black	40	890
Slate, white	30	920
Red rock	50	970
Slate and shells, black	60	1030
Red rock	15	1045
Slate and shells	135	1180
Sand, Maxton	25	1205
Little Lime, black	30	1235
Big Lime, white	180	1415
Sand, Big Injun (200,000 cu. ft. of gas at 1437')	25	1440
Sandy lime	20	1460
Slate and shells (600,000 cu. ft. of gas at 1515')	65	1525
Slate, black	25	1550
Slate and shells (1,500,000 cu. ft. of gas at 1590')	45	1595
Slate, black	9	1604

"Rock pressure, 245 lbs. to square inch."

Caroline Brewer No. 105 Well Record (130).

Warfield District, on south side of Marrowbone Creek, 0.2 mile southwest of Brewer Branch, and 1.9 miles northeast of Kermit; authority, United Fuel Gas Co.; commenced Jan. 20, 1905; completed. March 3, 1905; elevation, 606′ L.

	Thickness Feet.	Total Feet.
Drift	40	40
Slate	16	56
Sand	80	136
Lime	25	161
Slate	53	214

"Gas calculated to be 198,000 cu. ft.; 13″ drive pipe, 40′; 10″ casing, 298′; 8¼″ casing, 1086′."

The above boring starts flush with the crop of the Campbell Creek (No. 2 Gas) Coal, according to Reger. As is self-evident from the length of 8¼″ casing required, the log is incomplete. The gas pay is probably in the Big Lime.

John B. Wilkinson No. 1 Well Record (131).

Warfield District; on south side of Marrowbone Creek, 0.2 mile west of mouth of Brewer Branch, and 1.9 miles northeast of Kermit; authority, Meteor Carbon Co.; elevation, 620′ B.

	Thickness Feet.	Total Feet.
Gravel, brown (hole full of water at 20′)	28	28
Slate, black	37	65
Sand, white	35	100
Slate, black	25	125
Sand, white	15	140
Slate, white	15	155
Sand, white	20	175
Slate black	10	185
Sand, white (oil and gas, 210′)	33	218
Coal, Lower War Eagle	2	220
Slate, black (oil and gas, 235′)	40	260
Sand, dark	15	275
Lime, white	25	300
Slate, black (hole full of water, 320′; gas at 350′)	75	375
Sand, white	35	410
Coal, Sewell?	3	413
Slate, black	27	440
Sand, white, Upper Gilbert	30	470
Lime, white	25	495
Sand, white (gas at 535′)	135	630
Slate, black	10	640
Lime, white	60	700
Slate, black	10	710

	Thickness Feet.	Total Feet.
Sand, white	90	800
Slate, black	90	890
Red rock	20	910
Slate, white	20	930
Red rock	20	950
Slate, white	10	960
Red rock	60	1020
Slate, black	15	1035
Little Lime, black (gas at 1035')	35	1070
Pencil Cave	10	1080
Big Lime, white (gas at 1290')	230	1310
Big Injun Sand, red (oil at 1340'; gas at 1350')	40	1350
Slate and shells, white (gas at 1490')	152	1502

"220 ft. 10" casing; 2,587,840 cu. ft. of gas."

The above boring starts 15 feet above the Campbell Creek (No. 2 Gas) Coal. The coal seam at a depth of 218 feet appears to correlate with the Lower War Eagle, and that at 410 feet may represent the Sewell bed of the New River Series. This well had a fine showing of oil in the Big Injun, some of which is saved in a tank at the well, according to Reger, for which reason it is designated with an oil well symbol instead of gas on Map II, although a fine gasser.

John B. Wilkinson No. 2 Well Record (132).

Warfield District; on north side of Marrowbone Creek, 2.0 miles northeast of Kermit; authority, Meteor Carbon Co.; commenced April 25, 1912; completed May 25, 1912; elevation, 700' B.

	Thickness Feet.	Total Feet.
Gravel, brown	26	26
White slate,	15	41
Sand, white	8	49
Shells, white	40	89
Sand, gray	25	114
Shells, white	140	254
Sand, white (hole full of water, 280')	30	284
Slate, black	30	314
Sand, white, Salt (oil show, 320')	45	359
Shells, white	162	521
Sand, white	42	563
Slate, black	12	575
Sand, white (gas show, 600'; hole full of water, 720')	155	730
Lime, white	75	805
Slate, white	105	910
Red rock	10	920
Slate, black	20	940

	Thickness Feet.	Total Feet.
Lime, white	8	948
Red rock	22	970
Shells. white	83	1053
Slate, black	22	1075
Shells, white	42	1117
Big Lime (gas, 1251' 1261', 1320', and 1 bbl. oil 1360')	248	1365
Sand 38' Sand, white (gas 1403' and 1410') 22 } Big Injun	60	1425
Slate, white (gas, 1544')	133	1558

The above boring starts about 100 feet above the Campbell Creek (No. 2 Gas) Coal, and had a good showing of oil in the Big Lime. According to data given Reger, it would have made 8 to 10 barrels of black oil daily.

M. H. Waldron (Neighbert) Well Record (133).

Warfield District, on Marrowbone Creek, 1.2 miles northeast of Kermit; authority, Shaw, Reece & Co.; elevation, 610' B.

	Thickness Feet.	Total Feet.
Unrecorded	1065	1065
Big Lime	205	1270
Red slate	30	1300
Shale (gas 4,000 cu. ft. at 1394')	94	1394
Blue lime or sand shells	20	1414
Black slate	236	1650
Brown sand	2	1652
Black slate	173	1825
Gray slate	12	1837
Black slate	48	1885
Gray sand, Berea, (good showing of oil)	30	1915
Black slate	311	2226

"Well not shot—casing pulled and well plugged."

The above boring starts 10 feet below the Campbell Creek (No. 2 Gas) Coal.

James Vinson No. 447 Well Record (134).

Warfield District; on a branch south side of Marrowbone Creek. 1.2 miles northeast of Kermit; authority, United Fuel Gas Co.; commenced Nov. 29, 1912; completed Jan. 20, 1913; elevation, 800' B.

	Thickness Feet.	Total Feet.
Gravel	16	16
Slate	74	90
Sand	35	125

	Thickness Feet.	Total Feet.
Coal, Alma	5	130
Slate	6	136
Sand, Logan	29	165
Slate	25	190
Sand	35	225
Slate	30	255
Sandy lime	25	280
Slate	32	312
Sand	48	360
Slate	10	370
Lime	25	395
Slate	115	510
Lime	30	540
Slate	4	544
Lime	11	555
Slate	2	557
Sand, Salt (little gas at 560′ and 666′)	183	740
Slate	30	770
Sandy lime	30	800
Slate	10	810
Sand	60	870
Slate	10	880
Lime	15	895
Slate	20	915
Sand (hole full of water, 920′)	25	940
Slate	40	980
Red rock	40	1020
Slate	30	1050
Lime	20	1070
Slate	30	1100
Lime	25	1125
Red rock	15	1140
Lime	5	1145
Slate	15	1160
Lime	5	1165
Slate	5	1170
Sandy lime	20	1190
Slate	10	1200
Lime	15	1215
Sand	30	1245
Little Lime	25	1270
Lime 120′ Break 10 Lime 35 } **Big Lime**	165	1435
Red rock	25	1460
Slate (gas at 1478′)	30	1490
Slate and lime shells (gas at 1644′)	194	1684

10″ casing, 488′; 6⅝″ casing, 1278′; 1,360,000 cu. ft. gas daily, open flow.

The above boring starts about 185 feet above the Campbell Creek (No. 2 Gas) Coal, and is a gasser in the Big Injun Sand horizon.

James Vinson No. 101 Well Record (135).

Warfield District; on a branch south of Marrowbone Creek, 1.3 miles northeast of Kermit; authority, United Fuel Gas Co.; commenced Oct. 26, 1904; completed Dec. 20, 1904; elevation, 713' L.

	Thickness Feet.	Total Feet.
13" drive pipe	20	20
Shale	12	32
Coal, Alma	3	35
Lime	15	50
Sand	14	64
Shells	6	70
Sand (water at 125')	82	152
Sandy lime	13	165
Slate	16	181
Coal, Eagle?	6	187
Slate	13	200
Hard sand	6	206
Slate and lime	50	256
Sand	60	316
Black lime	35	351
Blue slate	60	411
Brown shale	43	454
Blue shale	81	535
Salt Sand (gas at 590'-605') (Salt water)	155	690
Brown lime and shells	110	800
Sand	18	818
Black lime shells and slate	52	870
Black shale	60	930
Black lime shells	50	980
Red slate	20	1000
Lime shells	18	1018
Red and blue slate	82	1100
Lime shells	20	1120
Red and blue slate	70	1190
Blue soft sand	17	1207
Lime shells	10	1217
Dark lime.... Big small gas at 1250'...	33	1250
more gas at 1340'		
Niagara? lime Lime and 1360'	202	1452
Red rock	15	1467
Shelly slate and sand, Big Injun	91	1558
Darkish blue slate or shells	154	1712

The above boring starts about 90 feet above the Campbell Creek (No. 2 Gas) Coal; hence, the correlation of the other seams noted in the record. The former bed was probably overlooked by the drillers.

James Vinson No. 479 Well Record (136).

Warfield District, on ridge 1.2 miles northeast of Kermit; authority, United Fuel Gas Co.; completed Jan. 4, 1913; elevation, 1180′ B.

	Thickness Feet.	Total Feet.
Unrecorded	130	130
Native coal, Winifrede?	5	135
Unrecorded	125	260
Coal, Hernshaw?	4	264
Unrecorded	61	325
Sand	35	360
Slate	60	420
Sand	30	450
Slate	60	510
Sand	20	530
Slate	60	590
Sand	35	625
Slate	80	705
Sand	25	730
Slate	55	785
Unrecorded	100	885
Sand, Salt	115	1000
Slate	15	1015
Salt Sand	120	1135
Slate	65	1200
Sand	150	1350
Slate	25	1375
Red rock	35	1410
Black lime	15	1425
Red rock	15	1440
Sand	15	1455
Red rock	35	1490
Slate	55	1545
Unrecorded	12	1557
Big Lime (small gas, 1638′)	213	1770
Slate and shells (2½ bbls. oil at 2008′)	458	2228
Berea Grit	22	2250
Slate to bottom	155	2405

8¼″ casing, 1170′; 6⅝″ casing, 1557′.

The above boring is located on the axis of the Warfield Anticline and starts about 550 feet above the Campbell Creek (No. 2 Gas) Coal. The correlation of the coal seams at 130 and 260 feet, respectively, is very uncertain.

The **Hiram Stepp Nos. 409 and 327 Wells (137 and 138 on Map II, respectively)**, located 0.4 mile north of Kermit, are gassers from the Big Lime. The detailed logs of these borings are published in part in connection with the Kermit Section, page 67.

The following is the record of a gas well on the Kentucky side of Tug Fork, opposite Kermit. This boring starts about 15 feet above the Campbell Creek (No. 2 Gas) Coal. The log does not state the horizon in which the gas was found, but it probably occurred in the Big Lime:

Berger Heirs No. 67 Well Record (139).

Martin County. Kentucky; 0.2 mile west of Kermit; authority, United Fuel Gas Co.; completed, fall of 1899; elevation, 614′ L.

		Thickness Feet.	Total Feet.
13″ casing		34	34
White slate		41	75
Gray sand		55	130
Sand of different colors		85	215
Gray sand		25	240
White sand		25	265
Gray sand		10	275
Slate shells		150	425
Salt Sand		230	655
Slate and shells		25	680
Gray sand		85	765
Slate		15	780
Red rock		70	850
Slate		20	870
Red rock		50	920
Gray sand, hard		10	930
Red rock		20	950
White slate		5	955
Red rock		35	990
Slate and shells		30	1020
Hard lime		10	1030
Slate		5	1035
Sand, Maxton		5	1040
Slate		60	1100
Big Lime		190	1290
Brown sand 15′	Big Injun	140	1430
Red sand 25			
Shells and streaks of sand 70			
Sand, red, to bottom 30			

"Initial gas volume, 1,909,000 cu. ft. daily."

The following is the record of a well, just off the west edge of Warfield District in Wayne County, in which the Campbell Creek (No. 2 Gas) Coal was encountered at a depth of 150 feet:

Caldwell and Colton No. 1 Well Record (107).

Lincoln District, Wayne County; on Stone Coal Branch, 1.5 miles southeast of Stonecoal; authority, Marrowbone Oil & Gas Co.; commenced Feb. 1, 1909; elevation, 700′ B.

	Thickness Feet.	Total Feet.
Unrecorded	2	2
Mud	3	5
Quicksand	34	39
Sand	11	50
Coal, Alma	3	53
Sand, Logan	47	100
Slate	50	150
Coal, "Warfield" (Campbell Creek, No. 2 Gas)	6	156
Sand, Brownstown	44	200
Slate	50	250
Sand (oil show at 290′)	65	315
Slate	85	400
Sand	50	450
Slate	50	500
Sand	60	560
Lime	25	585
Salt Sand (big flow of water at 640′)	55	640
Slate	3	643
Sand	17	660
Slate	5	665
Sand	110	775
Slate	25	800
Sand	160	960
Pink rock	10	970
Black lime	10	980
Red rock	30	1010
Slate	35	1045
Black lime	10	1055
Sand, Maxton	19	1074
Big Lime (nice show of gas at 1276′)	240	1314
Red broken sand 12′ Gray sand 91′ } **Big Injun**	103	1417
Black slate	433	1850
Berea Grit	10	1860
Slate to bottom	15	1875

185′ 8¼″ casing; 39′ 10″ casing; 1101½′ 6⅝″ casing.

Southward one mile, in the same county, the **Thos. Stepp Heirs Nos. 3, 1 and 2 Wells (108, 109 and 110, respectively, on Map II)**, were drilled by the Meteor Carbon Co. These are gassers from the Big Lime.

The **Berger Heirs Well (140 on Map II)** and the **York and Radcliff Well (141 on Map II)** are gassers, but no log was obtained of these borings. The producing horizon is probably the Big Lime.

The following is a brief summary of a Big Lime gasser that starts nearly flush with the crop of the Campbell Creek (No. 2 Gas) Coal:

John Dempsey Heirs No. 88 Well Record (142).

Warfield District; on east side of Tug Fork, 0.2 mile south of Kermit; authority, United Fuel Gas Co.; completed July, 1899; elevation, 622′ L.

"Turned into line March 1, 1902; 40′ of 10″ drive pipe; 700′ of 6⅝″ casing; shale gas at 900′; top of Big Lime 1075′; total depth 1302′; got gas in the last 15′ drilled; tubed with 2″ pipe; anchor packer set 200′ from the bottom; gauge 20 ft. from bottom."

The **McCormick, Dangerfield & Davis No. 89 (143 on Map II)** is reported to have had an initial volume, open flow, of 2,658,000 cubic feet daily. The Survey was unable to obtain the log of this boring.

The two following records are from Big Lime gassers located farther up Lower Burning Creek, only 0.3 mile northwest of the line of the Warfield Fault, the first of which is much larger than should ordinarily be expected so close to a break of this magnitude in the generally hard rock strata of the West Virginia oil and gas fields. It is true that the most prolific oil field of Peru, South America, is crossed by numerous faults running at all points of the compass, but there the "greda"—fine, sandy clay—and unconsolidated sediments of the Tertiary measures have effectually sealed the resulting fissures and prevented the escape of the contained oil and gas into the air. In the Kermit region, the streams—Upper, Middle and Lower Burning Creeks—have received their names from the fact that "gas" or "burning springs" occur along their courses where they are intersected by this fault, thus showing that the escape of the gas has been going on slowly for perhaps since late Permian time:

McCormick, Dangerfield & Davis No. 99 Well Record (144).

Warfield District; on Lower Burning Creek, 0.7 mile east of Kermit; authority, United Fuel Gas Co.; commenced Oct. 6, 1904; completed, Dec. 9, 1914; elevation, 687′ L.

	Thickness Feet.	Total Feet.
Drift	30	30
Quicksand	38	68

	Thickness Feet.	Total Feet.
White sand, Brownstown (water at 56′ and 100′)	40	108
Slate and shells	455	563
Salt Sand (gas at 662′; water at 675′)	317	880
Slate	20	900
Lime	21	921
Red rock	15	936
Slate	27	963
Red rock	22	985
Lime	23	1008
Red rock	20	1028
Red rock and slate	8	1036
Lime	11	1047
Red rock	40	1087
Lime	17	1104
Slate	6	1110
Lime	16	1126
Slate	8	1134
Red rock and shells	20	1154
Shells	30	1184
Slate	4	1188
Big Lime (good gas at 1300′)	177	1365
Slate and shells	64	1429
Blue slate	471	1900
Blue slate and shells	28	1928
Red sand, rusty, Berea	56	1984
Black slate	7	1991
Black shale	63	2054
Shells	26	2080
White slate	170	2250
Brown slate	160	2410
Black slate	71	2481
Soft brown slate	4	2485
Shells	7	2492
Black slate	193	2685
Shells	45	2730
Soft black slate	46	2776
Light slate	38	2814
Black slate	47	2861
Light slate	174	3035

"Gas calculated to be 2,382,000 cu. ft. daily from Big Lime."

The above boring starts 60 to 65 feet above the Campbell Creek (No. 2 Gas) Coal, and its record reveals an unusual thickness of alluvial material along the bed of Lower Burning Creek, a feature that may be intimately associated with the Warfield Fault.

McCormick, Dangerfield & Davis No. 103 Well Record (145).

Warfield District, on Lower Burning Creek, 1.0 mile east of Kermit; authority; United Fuel Gas Co.; commenced Jan. 7, 1905; completed Feb. 3, 1905; elevation, 744′ L.

	Thickness Feet.	Total Feet.
Drift	5	5
Quicksand	30	35
Lime	25	60
Slate	60	120
Lime	15	135
Slate	25	160
Coal, Campbell Creek (No. 2 Gas) ("Warfield")	3	163
Lime	17	180
Slate	75	255
Sand	34	289
Slate	51	340
Sand	70	410
Shells	50	460
Slate	105	565
Lime	10	575
Slate	45	620
Salt Sand	240	860
Slate	30	890
Sand	83	973
Slate	72	1045
Lime	8	1053
Slate	25	1078
Lime	5	1083
Slate	19	1102
Lime	8	1110
Red rock	25	1135
Slate	15	1150
Lime	18	1168
Red rock and shells	21	1189
Slate	6	1195
Lime	5	1200
Slate	36	1236
Lime	9	1245
Slate	6	1251
Big Lime (gas at 1374′ and 1454′)	204	1355
Slate	25	1480
Sand, Big Injun (oil at 1490′)	15	1495
Slate	112	1607

"Gas calculated to be 242,000 cu. ft. daily from Big Lime."

The **Jacob Beach No. 547 Well (146 on Map II)**, located on the head of Lower Burning Creek, 1.8 miles eastward from Kermit and barely east of the Warfield Fault, as outlined on Map II, was drilling at a depth of 580′ when visited by Reger during October, 1913. The following partial record was obtained at the well by Reger:

	Thickness Feet.	Total Feet.
Unrecorded	427	427
Coal, Williamson	3	430
Slate	25	455
Unrecorded	80	535
Coal, Alma (steel line)	2	537
Slate	43	580
Coal, Campbell Creek (No. 2 Gas)	3	583

The following brief data are from a gasser in both the Big Lime and the Big Injun, the first two pays occurring in the former zone, and the third, in the latter. The boring starts 15 to 25 feet above the Campbell Creek (No. 2 Gas) Coal:

McCormick, Dangerfield & Davis No. 90 Well Record (147).

Warfield District, just below mouth of Lower Burning Creek and 0.5 mile southeast of Kermit; authority, United Fuel Gas Co.; elevation, 619′ L.

Three streaks of gas in well:

1st streak at	1095 feet.
2nd streak at	1200 feet.
3rd streak at	1340 feet.
Total depth	1350 feet.

645 feet of 6¼″ casing.

Two wells have been drilled on Middle Burning Creek, the **Aaron Stepp No. 1 (148 on Map II)**, being a dry hole and the **Harry Chafin No. 1 (149 on Map II)**, a fair gas well. The Survey was unable to obtain the log of either of these borings.

In the southern portion of Warfield District, three wells have been drilled on the waters of Upper Burning Creek, two of which are Big Lime gassers and the other a dry hole. The Survey was able to obtain the logs of two, the details of which are as follows:

Burning Creek-Marrowbone Land Co. No. 1 Well Record (150).

Warfield District; on south side of Upper Burning Creek, 1.7 miles southeast of Kermit; authority, Ohio Oil, Gas and Distributing Co.; elevation, 625′ B.

	Thickness Feet.	Total Feet.
Quicksand	55	55
White slate, gritty (water at 75′ and 95′)	160	215
Coal, Alma	4½	219½
Slate	25½	245

	Thickness Feet.	Total Feet.
Coal, Campbell Creek (No. 2 Gas)	5	250
Slate	375	625
Shells and slate	75	700
Salt Sand, broken at bottom, (1 bailer of water per hour at 800')	220	920
Slate, shells and red rock	190	1110
Sandy shells and slate	80	1190
Maxton Sand	40	1230
Slate, shells and red rock	92	1322
Big Lime	174	1496
Big Injun	125	1621
White slate	243	1864
Slate (first shell at 1880')	180	2044
Black shale on top of Grit	20	2064
Berea Grit (first 40 feet of Grit broken and slaty; bottom, solid, firm and very hard, with small showing of oil)	117	2181

"Little Lime not present in this well, but 6 inches of pencil cave on top of lime; then came 2 pays in top of lime, first 5 to 6 feet in the lime, and 2nd, 12 feet in the lime; cased 4 feet under gas at 1338 feet.

"April, 1912; produced 1¾ millions gas daily and drowned."

Burning Creek-Marrowbone Land Co. No. 3 Well Record (152).

Warfield District; near head of Upper Burning Creek, 2.9 miles southeast of Kermit; authority, Ohio Oil, Gas and Distributing Co.; elevation, 935' B.

	Thickness Feet.	Total Feet.
Conductor	22	22
Sand	40	62
Slate	12	74
Sand	86	160
Coal (solid) Chilton?	4	164
Slate	46	210
Coal and slate, mixed, Little Chilton?	6	216
Slate	79	295
Sand	20	315
Slate	30	345
Lime shells	30	375
Slate	260	635
Sand	50	685
Slate	20	705
Sand	119	824
Slate	200	1024
Sand, broken at bottom	495	1519
Maxton Sand, wet	40	1559
Red rock, slate and shells	100	1659
Black lime	30	1689
Big Lime	183	1872
Big Injun, broken	37	1909
Slate	477	2386

	Thickness Feet.	Total Feet.
Black shale	30	2416
Berea, broken	40	2456
Berea, chocolate, with small slate breaks	48	2504
Slate	11	2515

"Show of oil in Berea at 56 ft., with 8 ft. of good sand."
"8¼" casing, 375'; and 6⅝" casing, 1689'."

The **Burning Creek-Marrowbone Land Co. No. 2 Well (151 on Map II),** located 2.4 miles eastward from Kermit on a lefthand branch of Upper Burning Creek, is reported a good gasser in the Big Lime, but the Survey was unable to obtain the log of this boring or any definite information concerning the same.

Prospective Oil and Gas Areas, Warfield District.

A study of Map II and the foregoing development in Warfield District shows that portion lying along the crest and slopes of the Warfield Anticline in the southwest region of the latter area to have been quite thoroughly tested. In other parts of the district, there yet remains quite a large acreage that would apparently justify further drilling: (1) that territory lying immediately along the crest of the Doane Anticline is especially favored by structure for gas in the Big Lime and Big Injun; (2), that, along the crest of the Warfield Anticline westward from the head of Marrowbone Creek to about two miles southwest of Swelled Hickory Gap, for gas at the same horizon, ever keeping in mind that the chances are the region may have been more or less drained by the Warfield Fault; and (3), that, in the southern point of the district, on the waters of Parsley Big Branch, in the Coalburg Basin, for oil in the same zones, in view of the several gas wells to the northwestward up the structural slope.

Hardee District (Mingo County).

Hardee District lies immediately south of Harvey and Warfield and adjoins the State of Kentucky along Tug Fork. A glance at Map II shows that it has a much warped structure and that its area is traversed by three structural folds; viz, the

Canterbury and Coalburg Synclines, and the Laurel Fork Anticline, the Campbell Creek (No. 2 Gas) Coal varying in elevation therein from only about 350′ above sea level at its extreme western point, to over 875′ above the same datum in the structural dome, 2¼ miles northwest of the common corner of Logan, Hardee and Harvey Districts. No test wells have ever been sunk for oil and gas within its borders. Its area in part is affected more or less by the development described on preceding pages for the two districts last mentioned.

Prospective Oil and Gas Areas, Hardee District.

The lack of test wells within the district makes it rather uncertain to outline as favorable one portion of Hardee above another for oil and gas, as there is left no means of determining the continuity of sands in good thickness and character. From a purely structural standpoint, the possibilities appear to favor three separate and distinct areas: (1) that, territory in the northern point of the district, lying on the structural terrace outlined by the wide divergence of the 550 and 575-foot contours on the Campbell Creek (No. 2 Gas) Coal, as exhibited on Map II, and drained by the waters of Coal Spring Fork, Spruce Fork and Bearpen Branch, appears favorable for oil with a chance for gas in the Big Lime, Big Injun and Berea; (2) that, along the crest of the Laurel Fork Anticline on the headwaters of Right Fork of Laurel, above the mouth of Millstone Branch, for gas at the same horizons; and (3) that, in the southern point of the district, lying on the structural terrace as shown on Map II northward from the main channel of Miller Creek to that portion of the 500-foot structure contour roughly parallel and three-fourths mile south of Pigeon Creek, for oil in the same sands.

Even in these portions of Hardee District, the drilling of a test well is more or less of a gamble for reasons enlarged upon under the discussion of the oil and gas development and possibilities of Logan and Triadelphia Districts on preceding pages of this Report.

Lee District (Mingo County).

Lee District lies immediately south of the one last described and is adjoined on the northeast by Logan County and on the southwest by the State of Kentucky. Almost its entire area lies along the eastern slope of the Coalburg Syncline, the general northwest dip of the strata being interrupted by two short local folds; viz, the Williamson Anticline and the Lick Creek Syncline. Only one test well has ever been drilled within its borders, this being the **Buffalo Land Co. No. 1 Well (160 on Map II)**, located in the western edge of the district, on Buffalo Creek, just above the mouth of South Fork. The detailed log of this boring is published in connection with the Chattaroy Section, page 75, from which it will be observed that it penetrated to a depth of 300 feet below the Berea Sand and that a light flow—250,000 cubic feet daily—of gas was encountered in the Big Injun Sand.

Prospective Oil and Gas Areas, Lee District.

As in Hardee, the absence of several test boring records scattered throughout Lee District to give an idea of the character and thickness of the usual producing sands, renders the problem of outlining favorable oil and gas areas quite difficult. Based on structure alone, there are three separate and distinct areas within the district that might be given special mention: (1) that, territory lying along the crest of the Williamson Anticline, extending from the head of Hell Creek southeastward with a width of about 2 miles to the Lee-Williamson District Line, is favorable for gas in the Big Lime, Berea and Big Injun, especially in the latter zone, in view of the gas encountered in the well last described above; (2) that, northeastward from Tug Fork along Lick Creek Syncline and the structural terrace formed by the wide divergence of the 625 and 650-foot structure contours between Pigeon Creek and Middle Fork of Elk, for oil at the same horizons; and (3) that, lying on waters of Elk Creek, eastward from the 800-foot structure contour as given on Map II, for gas in the same zones. Such structural features as those to which attention has been called in this district, if present in the northwestern counties of the State, would be almost sure to be accompanied by rich oil and gas pools. Of course, it follows that the rapid southeastern thickening of the Pottsville rocks below the Campbell Creek (No. 2 Gas) Coal causes the structure contours on Map II to show probably a much greater northwest dip than the deeper oil and gas zones mentioned above may possess, but a flexure in the strata like that represented by the Williamson Anticline probably influences the lie of the stratified rocks to a great depth.

Williamson District (Mingo County).

Williamson District covers a total area of only 3.32 square miles, immediately surrounding the City of Williamson. No test wells for either oil or gas have ever been sunk within its limits.

Prospective Gas Territory, Williamson District.

For reasons given under the discussion of Lee District above, that portion of Williamson District lying on and to the east of Williamson Creek, appears favorable for gas in the Big Lime, Berea and the Big Injun, especially the latter zone, in view of the good gas showing in the Buffalo Creek well (160 on Map II), 1½ miles northwestward down the structural slope.

Magnolia and Stafford Districts (Mingo County).

Magnolia and Stafford Districts occupy the southeastern portion of Mingo County and a glance at Map II shows their entire area lying on the steep eastern slope of the Coalburg Basin, with no prominent local folds or pronounced interruptions of the general northwest dip of the strata. Here it is a difficult matter to even decrease the chances of failure of the operator to find oil or gas in paying quantities. No test well has ever been drilled within the borders of either district.

The **Jackson Mounts No. 1 Well (161 on Map II),** located on Poplar Creek, in the State of Kentucky, ½ mile southwest of Cedar, in Mingo County (W. Va.), drilled during 1913, was a dry hole through the Berea Sand. The Survey was able to obtain only a part of the log of this boring, the details of which are published in connection with the Cedar Section, page 86. From a purely structural standpoint, this well was ideally located for oil on a marked structural terrace, as exhibited by the wide divergence of the 1175 and the 1200-foot structure contours in the Cedar region.

Prospective Areas, Magnolia and Stafford Districts.

-The foregoing data thus show that the attempt to find oil and gas in these two districts is an extremely hazardous undertaking from a financial standpoint. The southeast border of Stafford District occupies a high structural level as compared to the western portions of the county and for this reason may be gas bearing. The Big Lime and Big Injun Sands in this region could be reached at a comparatively shallow depth by a test well located along the banks of Guyandot River near Justice, or Tug Fork above Alnwick.

The further development of any oil or gas pool that might accidentally be opened would, in Magnolia and Stafford, be greatly facilitated by using the structure contours on Map II.

CHAPTER VIII.

COAL.

In Chapters V and VI, a systematic discussion has been given of all the coals that were observed in the two counties, giving their type section and correlation, as well as detailed sections of some of the less important seams. In the present Chapter, numerous sections will be given of all those coals which are of commercial thickness and purity, together with an estimate of the probable tonnage to be derived from each, and finally a table of analyses showing the chemical composition of all the coal samples collected.

STATISTICS OF COAL PRODUCTION.

Commercial mining in Logan and Mingo has been carried on in eleven beds; viz, Coalburg, Buffalo Creek, Chilton, Dingess, Williamson, Cedar Grove, Lower Cedar Grove, Alma, Campbell Creek (No. 2 Gas), Eagle and Cedar, all of which are in the Kanawha Series. These coals are mined almost entirely by drift or slope, only one shaft mine, the Gray Eagle Coal Co. at Kermit, being located within the two counties. In many localities, some of these coals are under the surface, but owing to the abundance of coal above drainage that can be mined cheaply, it has not been necessary to shaft for them. In Logan County mining is confined to the territory tributary to the Chesapeake and Ohio Railway along the valleys of the Guyandot and Little Coal Rivers, and in Mingo all the coal that is mined is on the Norfolk and Western Railway along the valley of Tug Fork of Big Sandy and tributary streams. Commercial mines were formerly operated at Dingess on West Fork of Twelvepole, but these plants have been dismantled.

The following tables are compiled from the Annual Report of John Laing, Chief of the Department of Mines of West Virginia, for the year ending June 30, 1912:

Coal Production of Logan County from 1894 to 1914, Inclusive.

Year	Tons of 2240 lbs.	Year	Tons of 2240 lbs.
1894	52,673	1906	349.228
1895	40,610	1907	740,607
1896	......	1908	1,215,039
1897	......	1909	1,909,063
1898	......	1910	2,213,372
1899	......	1911	2,663,155
1900	......	1912	3,243,033
1901	......	1913	4,119,577
1902	......	1914	5,333,943
1903	......		
1904	......	Total	22,007,916
1905	127,616		

Coal Production of Mingo County from 1895 to 1914, Inclusive.

Year	Tons of 2240 lbs.	Year	Tons of 2240 lbs.
1895	95.279	1906	1,719,233
1896	111,800	1907	1.867,100
1897	267,789	1908	1,714,807
1898	383,280	1909	1,617,581
1899	350,294	1910	2,045,420
1900	466,695	1911	2,036,223
1901	501,410	1912	2,374,563
1902	635,113	1913	2,271,591
1903	864,464	1914	2,510,568
1904	1,153,013		
1905	1,375,233	Total	24,361,456

Order of Counties in the Production of Coal, 1897-1912.

Counties	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
Fayette	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2
McDowell	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1
Marion	3	3	3	3	3	3	3	4	3	4	4	4	4	4	4	4
Kanawha	4	4	4	4	4	4	5	3	4	3	3	3	3	3	3	3
Mercer	5	5	5	6	6	6	6	6	6	6	6	6	6	7	8	8
Harrison	9	9	8	7	5	5	4	5	5	5	5	5	5	5	5	6
Tucker	6	6	7	5	7	7	7	8	8	8	10	10	10	10	10	10
Mingo	8	8	9	9	9	8	8	7	7	7	7	7	9	9	9	9
Mineral	7	7	6	8	8	9	11	11	12	13	14	13	11	13	15	17
Preston	13	11	10	10	10	10	9	10	10	9	9	11	13	11	11	11
Taylor	10	10	11	11	11	11	14	16	16	16	17	17	16	15	14	13
Marshall	11	12	12	12	13	16	13	14	14	15	15	18	19	16	18	16
Randolph	..	..	..	14	14	14	12	13	13	12	13	14	14	14	13	14
Barbour	19	19	17	18	12	12	10	9	11	11	11	12	12	12	12	12
Raleigh	16	16	16	19	17	13	15	12	9	10	8	8	8	6	6	5
Putnam	12	13	13	13	15	15	16	15	15	14	18	16	17	17	17	18
Ohio	15	15	14	15	16	17	18	19	21	22	21	21	21	20	20	20
Brooke	17	18	18	20	20	20	23	22	17	17	16	15	15	18	16	15
Mason	14	14	15	16	18	19	19	20	22	21	22	22	22	22	22	25
Grant	..	..	..	..	..	..	22	18	19	19	20	20	20	21	21	23
Logan	..	..	..	..	..	..	..	..	20	18	12	9	7	8	7	7
Monongalia	20	17	19	17	19	18	17	17	18	20	19	19	18	19	19	19
Hancock	18	20	20	21	21	21	20	21	24	24	23	25	26	24	27	..
Clay	..	..	..	..	..	..	..	25	23	23	24	27	30	30	25	24
Nicholas	..	..	..	..	..	22	24	24	25	25	25	26	27	26	24	29
Lincoln	..	..	..	..	..	23	21	23	27	26	30	30	25	28	28	..
Braxton	..	..	..	..	..	..	..	..	..	..	26	23	23	23	23	22
Wayne	..	..	..	..	..	..	..	..	26	27	29	29	28	29	32	28
Upshur	..	..	..	..	..	..	..	..	..	28	27	24	24	25	29	31
Greenbrier	..	..	..	..	..	..	..	..	..	..	28	28	29	32	30	27
Lewis	..	..	..	..	..	..	..	..	..	..	31	31	32	33	33	30
Gilmer	..	..	..	..	..	..	..	..	..	..	32	32	31	31	31	..
Wyoming	..	..	..	..	..	..	..	..	..	..	..	33	34	34	..	..
Boone	..	..	..	..	..	..	..	..	..	..	..	..	33	27	26	21

Production of Coal and Coke, by Mines, in Logan County, for the Year Ending June 30th, 1912.

Name of Company.	Name of Mine.	Production of Coal. (Long Tons). 1st 6 Months.	2nd 6 Months.	Total Coal Produced for Year.	Distribution of Coal. (Tons of 2240 Lbs.) Used in Operation of Mine.	Furnished Local Trade and Tenants.	Quantity Shipped from Mine.	Railroad Located on.
Coal River Coal & Coke Co.	Dobra	7,730	17,116	24,846	600	.....	24,246	C. & O.
Spruce Bend Coal Co.	Sharpless	1,315	18,810	20,125	785	510	18,830	C. & O.
Coal Valley Mining Co.	Sylvia	8,101	36,302	44,403	1,125	175	43,103	C. & O.
Mifflin Coal Co.	Mifflin No. 1	....	13,615	13,615	50	200	13,365	C. & O.
Black Hawk Colliery Co.	Black Hawk	6,110	8,400	14,510	......	110	14,400	C. & O.
Stone Branch Coal Co.	Stone Branch	25,177	38,050	63,227	1,650	550	61,027	C. & O.
Guyandot Coal Co.	Guyandot	21,943	22,297	44,240	843	436	42,961	C. & O.
E. R. Johnson Coal Mining Co.	Johnson Nos. 1 and 2	24,000	16,000	40,000	4,000	3,600	32,400	C. & O.
Draper Coal & Coke Co.	Draper	14,990	26,000	40,990	......	8,950	32,040	C. & O.
H. T. Wilson Coal Co.	Wilson	36,935	36,936	73,871	1,200	.....	72,671	C. & O.
Fort Branch Coal Corp.	Fort Branch	26,163	26,563	52,726	2,400	240	50,086	C. & O.
Price Coal Co.	Wanda	36,189	24,763	60,952	753	247	59,952	C. & O.
Manitoba Coal Co.	Manitoba	27,968	33,458	61,426	2,489	392	58,545	C. & O.
Rex Coal & Coke Co.	Rex	43,467	31,633	75,100	836	297	73,967	C. & O.
Logan Coal Co.	Logan	32,014	37,092	69,106	1,336	534	67,236	C. & O.
Ethel Coal Co.	Ethel Nos. 1-2	41,364	49,282	90,646	1,800	300	88,546	C. & O.
Monitor Coal & Coke Co.	Monitor and Beechwood	109,078	116,811	225,889	3,600	736	221,553	C. & O.
Yuma Coal & Coke Co.	Yuma	44,238	53,020	97,258	2,014	456	94,788	C. & O.
Gay Coal & Coke Co.	Gay	47,319	49,608	96,927	900	327	95,700	C. & O.
Shamrock Coal Co.	Litz	19,300	37,810	57,110	......	571	56,539	C. & O.
Cora Coal Co.	Cora	43,031	56,505	99,536	......	1,200	98,336	C. & O.
United States Coal & Oil Co.	Island Ck. No. 1	256,299	223,332	479,631	7,448	14,008	458,175	C. & O.
United States Coal & Oil Co.	Island Ck. No. 2	212,259	182,254	394,513	3,803	474	390,236	C. & O.
United States Coal & Oil Co.	Island Ck. No. 3	140,134	97,152	237,286	796	216	236,274	C. & O.
United States Coal & Oil Co.	Island Ck. No. 4	100,977	117,843	218,820	860	1,498	216,462	C. & O.
United States Coal & Oil Co.	Island Ck. Nos. 5-6	106,657	108,883	215,540	1,299	129	214,112	C. & O.
United States Coal & Oil Co.	Island Ck. No. 7	24,969	39,869	64,838	88	.....	64,750	C. & O.
United States Coal & Oil Co.	Island Ck. No. 8	17,520	30,545	48,065	31	357	47,677	C. & O.
United States Coal & Oil Co.	Island Ck. Nos. 9-10	51,073	54,036	105,109	254	987	103,868	C. & O.
Manbar Coal Co.	Manbar	1,148	8,269	9,417	......	658	8,759	C. & O.
Ferndale Coal Co.	Ferndale	3,349	25,343	28,692	822	68	27,802	C. & O.
Aracoma Coal Co.	Aracoma	7,327	61,792	69,119	2,169	301	66,649	C. & O.
Kohinoor Coal & Coke Co.	Kohinoor	....	5.500	5,500	200	100	5,200	C. & O.
Total	....	1,358.144	1,704,889	3,243,033	44,151	38,627	3,160,255	

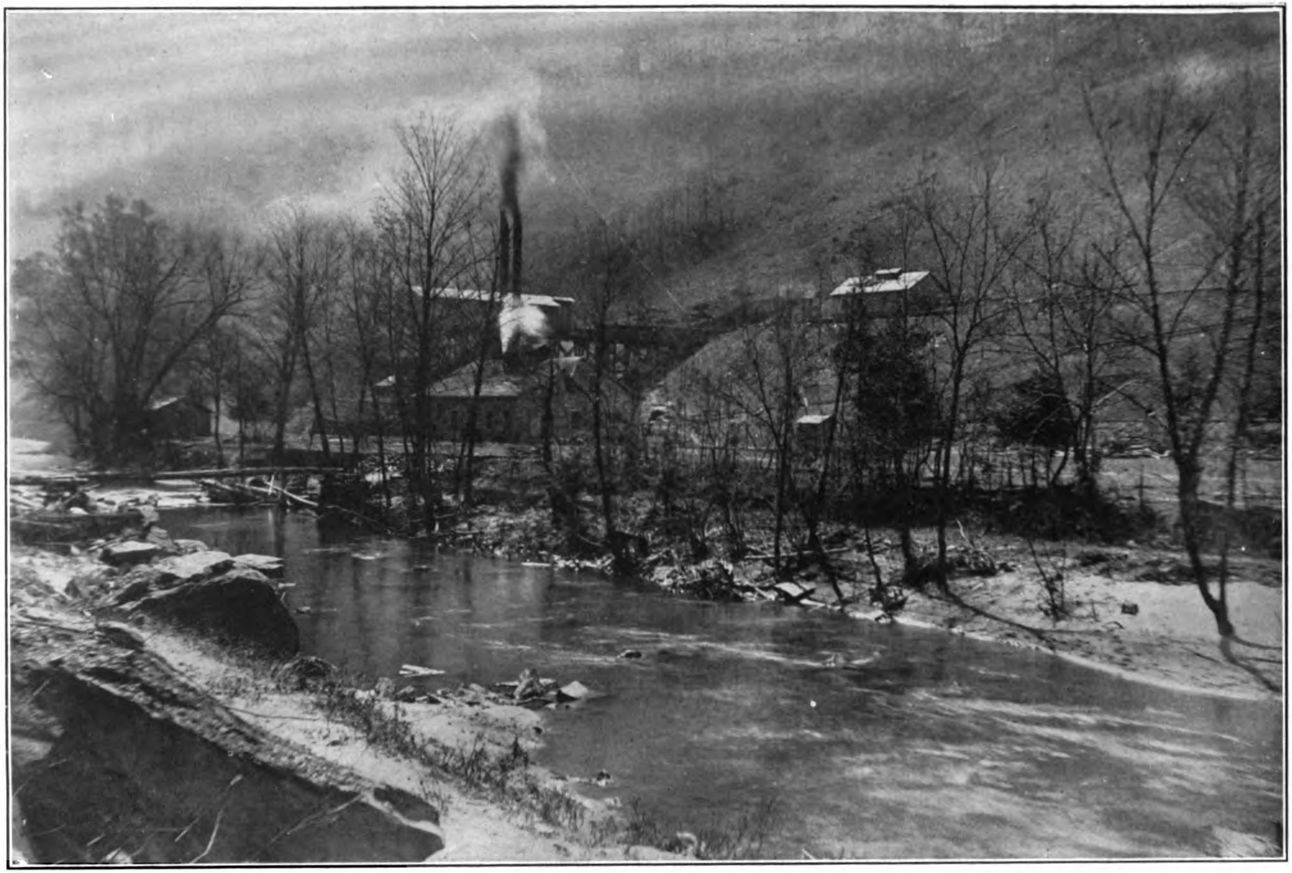

PLATE VII.—Showing plant of Coal Valley Mining Company on Spruce Fork, Logan County, and topography of Kanawha Series.—Courtesy of J. C. Blair.

Production of Coal and Coke, by Mines, in Mingo County, for the Year Ending June 30th, 191

Production of Coal and Coke, by Mines, in Mingo County, for the Year Ending June 30th, 1912.

Name of Company.	Name of Mine.	Production of Coal. (Long Tons).			Distribution of Coal. (Tons of 2240 Lbs.)			Railroad Located on.
		1st 6 Months.	2nd 6 Months.	Total Coal Produced for Year.	Used in Operation of Mine.	Furnished Local Trade and Tenants.	Quantity Shipped from Mine.	
Jas. R. Shanklin Coal Co.	Naugatuck	30,386	35,975	66,361	6,000	500	59,861	N. & W.
Gray Eagle Coal Co.	Gray Eagle	....	4,596	4,596	750	250	3,596	N. & W.
Chattaroy Colliery Co.	Chattaroy	31,250	29,200	60,450	1 600	400	58,450	N. & W.
Buffalo Collieries Co.	Buffalo	67,520	64,290	131,810	3,357	785	127,668	N. & W.
Howard Colliery Co.	Howard	48,581	50,587	99,168	1,200	500	97,468	N. & W.
Howard Junior Coal Co.	Howard, Junior	45,212	45,463	90,675	1,200	500	88,975	N. & W.
E. L. Sternberger Coal Co.	Sternberger	48.588	41,440	90,028	1,144	674	88,210	N. & W.
Williamson Coal & Coke Co.	Winifrede or No. 3	48,727	50,213	98,940	2,160	600	96,180	N. & W.
Superior-Thacker C. & C. Co.	Williamson No. 1	12,873	12,792	25,665	......	7,013	18,652	N. & W.
Crystal Block C. & C. Co.	Winifrede No. 1	21,302	27,142	48.444	1,000	156	47,288	N. & W.
White Star Mining Co.	White Star	22,253	22,254	44,507	1,500	360	42,647	N. & W.
Great Bend Coal Co.	Great Bend	11,929	9,356	21,285	850	264	20,171	N. & W.
Marvin Coal Co.	Marvin Nos. 1-2	20,600	20,874	41,474	1,250	774	39,450	N. & W.
Red Jacket Cons. C. & C. Co.	Rutherford	14,132	2,989	17,121	......	3,200	13,921	N. & W.
Red Jacket Cons. C. & C. Co.	Red Jacket	25,945	16,673	42,618	2,400	37	40,181	N. & W.
Red Jacket Cons. C. & C. Co.	Lick Fork	26,814	8,995	35,809	......	201	35,608	N. & W.
Red Jacket Cons. C. & C. Co.	Grapevine	30,112	23,084	53,196	......	......	53,196	N. & W.
Red Jacket Cons. C. & C. Co.	Mitchell Branch	70,016	124,985	195,001	1,250	656	193,095	N. & W.
Magnolia Coal & Coke Co.	Magnolia	9,527	14,167	23,694	963	510	22,221	N. & W.
Thacker Coal & Coke Co.	Thacker No. 2, 3, 6, 7, 8, 9	102,125	102,125	204,250	......	3,000	201,250	N. & W.
Thacker Coal & Coke Co.	Thacker No. 10	51,800	51,800	103,600	......	3,600	100,000	N. & W.
Thacker Coal & Coke Co.	Nos. 11, 12, 13, 14	25,000	25,000	50,000	10,000	......	40,000	N. & W.
Red Jacket Junior Coal Co.	Nos. 1-2	88,843	96,403	185,246	1,800	1,800	181,646	N. & W.
Glen Alum Coal Co.	Nos. 1. 2, 3	151,148	130,134	281,282	5,760	2,000	273,522	N. & W.
War Eagle Coal Co.	Pappoose	31,469	30,049	61,518	......	......	61,518	N. & W.
War Eagle Coal Co.	Mephisto	39,357	37,975	77,332	7,200	900	69,232	N. & W.
Margaret Mining Co.	Margaret No. 1	33,422	27,031	60,453	800	400	59 253	N. & W.
Sycamore Coal Co.	Cinderella	40,321	59,979	100,300	2,250	825	97,225	N. & W.
Mary Helen Coal Co.	Mary Helen	35,455	24,285	59,740	1,357	375	58,008	N. & W.
Total		1,184,707	1,189,856	2,374,563	55,791	30,280	2,288,492	

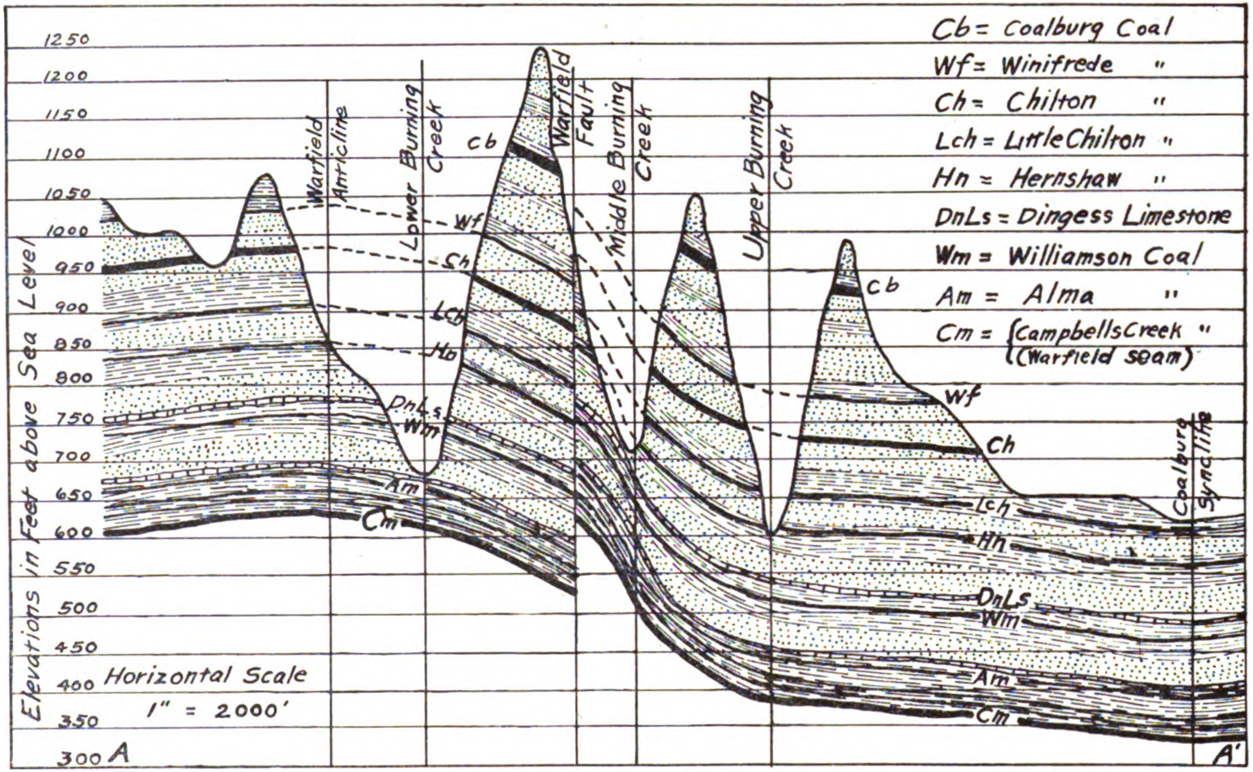

Figure 3. Cross Section of Warfield Fault.

In Logan and Mingo there are 18 minable coals above drainage, in addition to 16 other smaller coals that are too thin, impure or irregular to be considered as minable so long as the thick seams are available. These minable coals in descending order are the No. 5 Block, of the Allegheny Series; the Stockton, Coalburg, Buffalo Creek, Winifrede, Chilton "A", Chilton, Dingess, Williamson, Cedar Grove, Lower Cedar Grove, Alma, Campbell Creek (No. 2 Gas), Eagle, Bens Creek, Cedar, Lower War Eagle, and Glenalum Tunnel, of the Kanawha Series.

Fig. 4 shows the different coal seams of the two counties, giving both their relative importance and the maximum intervals between them. Owing to the fact that some of these coals and the intervening sandstones thin out completely in the western part of the area, the figure does not show true conditions for that region. Detailed sections in Chapters IV and VI and in the present Chapter will show what coals may be found in the different parts of the two counties.

RECORDS OF COAL TEST BORINGS IN LOGAN COUNTY.

Summarized Records.

In Logan County 51 diamond drill tests for coal have been made. Nearly all of these locations were visited by some member of the Survey staff to determine their elevations and fix the correlations of the coals in them by measurements up to known surface horizons.

The following table contains the summarized records of nearly all these tests, as well as several others just across the Boone County Line on the northeast.

In the table, the first column shows the reference number which appears on Map II along with a circular symbol for the location of the well, both being printed on the map in black to distinguish them readily from oil and gas wells, which are in red.

In the column under Elevation, "A. T." signifies "Above Tide", referring to sea level, and the letter "B" indicates that

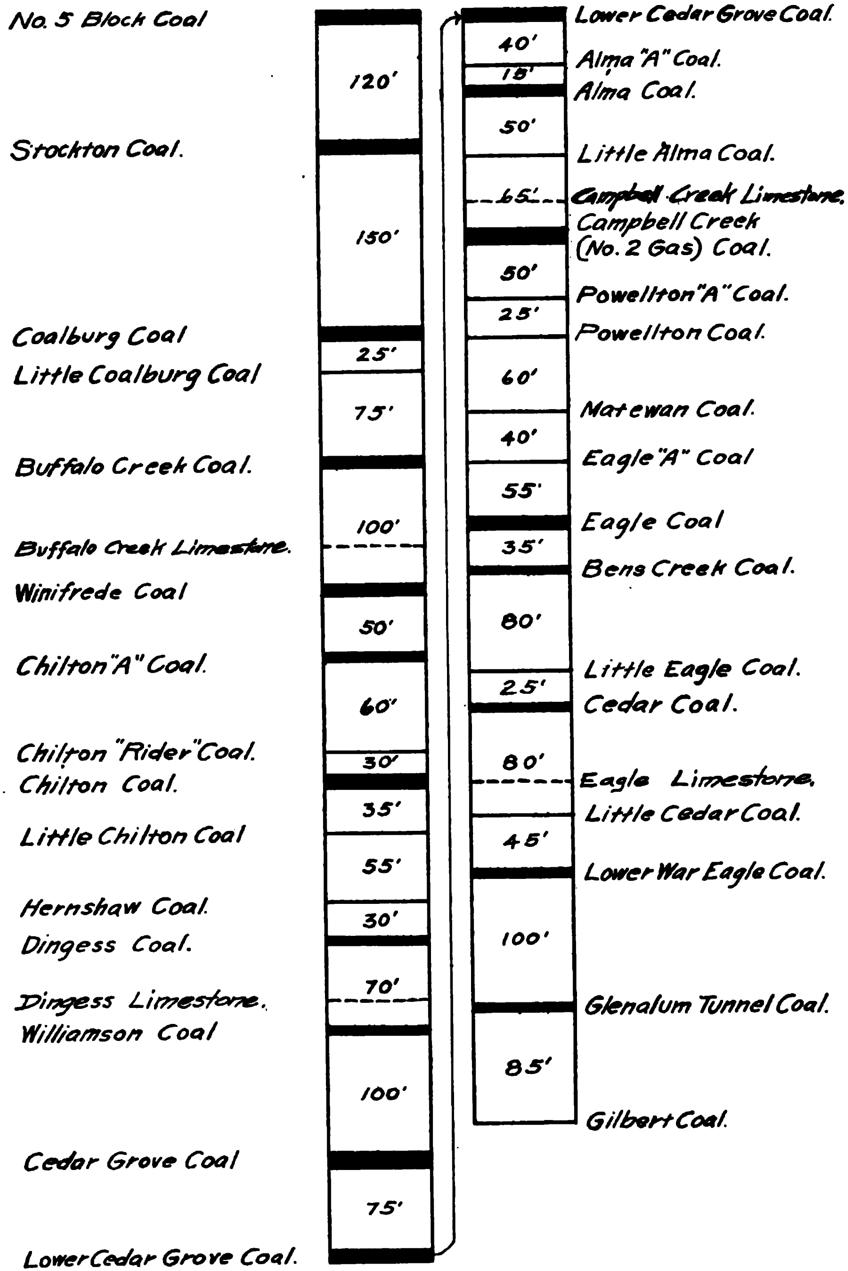

Figure 4.—Showing maximum intervals in feet between Coal Seams of the Logan–Mingo Area. All except No. 5 Block in Kanawha Series. (See Text.)

the level was determined by aneroid barometer, checked on the nearest U. S. Geological Survey spirit level bench mark, and the letter "L" indicates a determination by hand or spirit level.

The names of the Boone County Coal Corporation and the Laurel Coal and Land Company have been slightly abbreviated:

Summarized Record of Tests

No. on Map 11.	Name of Property.	Magisterial District.	Company.	Elevation A. T.
25	Boone Co. Coal Corp. No. 2..	Washington (Boone).	Boone Co. Coal Corp....	798L
26	Boone Co. Coal Corp. No. 4..	Washington (Boone).	Boone Co. Coal Corp....	840L
27	Boone Co. Coal Corp. No. 5..	Washington (Boone)	Boone Co. Coal Corp....	835B
28	Boone Co. Coal Corp. No. 4..	Crook (Boone)......	Boone Co. Coal Corp....	1790B
29	Laurel C. & L. Co. No. 2....	Crook (Boone)......	Laurel Coal & Land....	1010B
30	Laurel C. & L. Co. No. 1....	Crook (Boone)......	Laurel Coal & Land....	1100B
31	Laurel C. & L. Co. No. 3....	Crook (Boone)......	Laurel Coal & Land....	1190B
32	Laurel C. & L. Co. No. 10...	Washington (Boone).	Laurel Coal & Land....	1217L
33	Laurel C. & L. Co. No. 9....	Washington (Boone).	Laurel Coal & Land....	1038L
34	Laurel C. & L. Co. No. 3....	Washington (Boone)	Laurel Coal & Land....	970L
35	Laurel C. & L. Co. No. 1....	Washington (Boone)	Laurel Coal & Land....	1006L
36	Laurel C. & L. Co. No. 16...	Washington (Boone)	Laurel Coal & Land....	1025B
37	Laurel C. & L. Co. No. 4....	Washington (Boone)	Laurel Coal & Land....	1065L
38	Laurel C. & L. Co. No. 5....	Washington (Boone)	Laurel Coal & Land....	1042L
39	Laurel C. & L. Co. No. 11...	Washington (Boone)	Laurel Coal & Land....	1123L
40	Laurel C. & L. Co. No. 6....	Washington (Boone)	Laurel Coal & Land....	1067L
41	Laurel C. & L. Co. No. 7....	Washington (Boone)	Laurel Coal & Land....	1097L
42	Laurel C. & L. Co. No. 15...	Washington (Boone)	Laurel Coal & Land....	1160B
43	Laurel C. & L. Co. No. 8....	Washington (Boone)	Laurel Coal & Land....	1128L
44	Laurel C. & L. Co. No. 13...	Washington (Boone).	Laurel Coal & Land....	1245B
45	Laurel C. & L. Co. No. 12...	Washington (Boone).	Laurel Coal & Land....	1190B
46	Laurel C. & L. Co. No. 14...	Washington (Boone).	Laurel Coal & Land....	1225B
47	Laurel C. & L. Co. No. 2....	Washington (Boone).	Laurel Coal & Land....	1233L
47A	Cassingham No. 2..........	Washington (Boone).	Crawford & Ashby.....	1400B
48	Coal River Land Co. No. 4...	Washington (Boone).	Coal River Land.......	1420B
49	Cassingham No. 1..........	Washington (Boone).	Crawford & Ashby.....	1570B
50	Boone Co. Coal Corp. No. 1..	Logan	Boone Co. Coal Corp....	805L
51	Coal River Land Co. No 1...	Logan	Coal River Land.......	....
52	Boone Co. Coal Corp. No. 5..	Logan	Boone Co. Coal Corp....	915L
52A	Boone Co. Coal Corp. No. 7..	Logan	Boone Co. Coal Corp....	1290L
53	Boone Co. Coal Corp. No. 6..	Logan	Boone Co. Coal Corp....	1018L
54	Boone Co. Coal Corp. No. 11.	Logan	Boone Co. Coal Corp....	1010B
55	Boone Co. Coal Corp. No. 3..	Logan	Boone Co. Coal Corp....	830B
56	Coal River Land Co. No. 2...	Logan	Coal River Land.......	1120B
57	Boone Co. Coal Corp. No. 6..	Logan	Boone Co. Coal Corp....	1880B
58	Boone Co. Coal Corp. No. 5..	Logan	Boone Co. Coal Corp....	1385B
59	Boone Co. Coal Corp. No. 3..	Logan	Boone Co. Coal Corp....	1920B
60	Logan Mining Co..........	Logan	Logan Mining Co......	1130B
61	Dingess-Rum Coal Co. No. 7.	Logan	Dingess-Rum Coal......	1082L
62	Dingess-Rum Coal Co. No. 6	Logan	Dingess-Rum Coal......	1058L
63	Unknown	Logan	....	....
64	Dingess-Rum Coal Co. No. 1.	Logan	Dingess-Rum Coal......	1140L
65	Unknown	Logan	....	....
66	Unknown	Logan	....	....
67	Dingess-Rum Coal Co. No. 2.	Logan	Dingess-Rum Coal......	1095L
68	Dingess-Rum Coal Co. No. 1.	Logan	Dingess-Rum Coal......	1032L
69	Dingess-Rum Coal Co. No. 1.	Logan	Dingess-Rum Coal......	995B
70	Dingess-Rum Coal Co. No. 4.	Logan	Dingess-Rum Coal......	716L
71	Dingess-Rum Coal Co. No. 5.	Logan	Dingess-Rum Coal......	789L
72	Dingess-Rum Coal Co. No. 3.	Logan	Dingess-Rum Coal......	670L
73	Dingess-Rum Coal Co. No. 2.	Logan	Dingess-Rum Coal......	660B
74	Dingess-Rum Coal Co. No. 2.	Logan	Dingess-Rum Coal......	663L
75	Dingess-Rum Coal Co. No. 1.	Logan	Dingess-Rum Coal......	680L
77	Robert Lawson No. 2........	Logan	Logan Mining Co.... ..	804L
78	J. A. Sheppard et al No. 1..	Logan	Sheppard et al.........	760B
79	Robert Lawson No. 3........	Logan	Logan Mining Co......	1015B
80	J. A. Sheppard et al. No. 4..	Logan	Sheppard et al.........	685B
81	J. A. Sheppard et al. No. 5..	Logan	Sheppard et al.........	690B
82	J. A. Sheppard et al. No. 2..	Logan	Sheppard et al.........	675B
83	J. A. Sheppard et al. No. 3..	Logan	Sheppard et al.........	....
84	Dingess-Rum Coal Co. No. 2.	Logan	Dingess-Rum Coal......	681L
85	Dingess-Rum Coal Co. No. 1	Logan	Dingess-Rum Coal......	744L
86	Dingess-Rum Coal Co. No. 6.	Logan	Dingess-Rum Coal......	1023L
87	Dingess-Rum Coal Co. No. 4.	Logan	Dingess-Rum Coal......	819L
88	Dingess-Rum Coal Co. No. 8.	Logan	Dingess-Rum Coal......	877L
89	Dingess-Rum Coal Co. No. 5.	Logan	Dingess-Rum Coal......	939L
91	U. S. Coal & Oil Co. No. 6..	Logan	U. S. Coal & Oil......	957L
92	U. S. Coal & Oil Co. No. 5..	Logan	U. S. Coal & Oil......	849L
93	U. S. Coal & Oil Co No. 3..	Logan	U. S. Coal & Oil......	1070L
94	U. S. Coal & Oil Co. No. 2..	Logan	U. S. Coal & Oil......	906L
95	U. S. Coal & Oil Co. No. 1..	Logan	U. S. Coal & Oil......	808L
96	U. S. Coal & Oil Co No. 4..	Logan	U. S. Coal & Oil......	891L
98	Wood, Cole & Crane No. 4..	Logan	Wood, Cole & Crane...	925B
99	Wood, Cole & Crane No. 1..	Logan	Wood, Cole & Crane...	980L
100	Wood, Cole & Crane, No. 3..	Logan	Wood, Cole & Crane...	1190B
101	Wood. Cole & Crane No. 2..	Logan	Wood, Cole & Crane...	1137B
102	Wood, Cole & Crane No. 5..	Logan	Wood, Cole & Crane...	1210B

for Coal in Logan County.

Coalburg Coal		Chilton Coal		Cedar Grove Coal		Alma Coal		Campbell Creek Coal			
Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Total Depth.	No. on Map II.
......	......	......	......	68	1.7	140	3.5	......	......	184	25
......	......	......	......	148	2.1	216	5.6	......	......	226	26
......	......	......	......	......	......	293	6.1	......	......	303	27
274	7.5	......	......	......	......	......	......	......	......	487	28
......	......	......	......	......	......	171	7.0	245	4.8	253	29
......	......	......	......	......	......	204	6.9	286	4.2	298	30
......	......	......	......	......	......	256	9.2	339	6.7	347	31
......	......	......	......	......	......	334	0.3	434	2.7	455	32
......	......	......	......	......	......	281	6.5	346	5.2	356	33
......	......	......	......	......	......	116	0.2	211	6.4	218	34
......	......	......	......	......	......	133	6.5	229	7.2	245	35
......	......	......	......	......	......	132	3.2	226	7.9	237	36
......	......	......	......	......	......	175	3.3	266	8.2	276	37
......	......	......	......	......	......	129	7.7	220	7.7	229	38
......	......	......	......	......	......	220	7.3	307	8.0	317	39
......	......	......	......	......	......	122	4.7	206	6.0	454	40
......	......	......	......	......	......	124	6.8	210	7.0	287	41
......	......	......	......	......	......	145	6.9	223	6.7	231	42
......	......	......	......	......	......	157	4.7	239	6.5	311	43
......	......	......	......	......	......	271	2.8	346	5.8	355	44
......	......	......	......	......	......	125	14.4	217	5.7	225	45
......	......	......	......	......	......	151	4.0	236	5.8	245	46
......	......	......	......	......	......	116	4.5	193	6.8	202	47
......	......	......	......	134	1.9	184	5.2	328	1.4	339	47A
......	......	......	......	......	......	......	......	......	......	201.8	48
......	......	......	......	260	1.9	349	3.3	449	5.2	642	49
......	......	......	......	187	2.2	248	4.2	355	2.0	357	50
......	......	......	......	230	3.1	264	6.1	......	......	347	51
......	......	35	5.8	......	......	......	......	......	......	48	52
74	6.2	412	6.4	......	......	......	......	......	......	419	52A
......	......	95	5.1	......	......	......	......	......	......	108	53
......	......	59	8.2	298	5.5	349	3.5	......	......	435	54
......	......	......	......	177	3.8	225	1.7	......	......	258	55
......	......	......	......	188	5.7	287	3.0	......	......	261	56
208	3.7	......	......	......	......	......	......	......	......	529	57
......	......	......	......	293	6.1	......	......	......	......	303	58
273	11.9	......	......	......	......	......	......	......	......	540	59
......	......	......	......	......	......	......	......	......	......	......	60
......	......	84	4.8	......	......	......	......	......	......	108	61
......	......	54	4.4	......	......	......	......	......	......	74	62
......	......	......	......	......	......	......	......	......	......	......	63
......	......	66	6.8	324	8.8	391	5.0	......	......	398	64
......	......	......	......	......	......	......	......	......	......	......	65
......	......	......	......	......	......	......	......	......	......	......	66
......	......	184	4.8	......	......	......	......	......	......	140	67
......	......	78	5.4	......	......	......	......	......	......	105	68
......	......	25	3.6	249	2.0	......	......	......	......	298	69
......	......	......	......	49	1.5	134	5.1	......	......	143	70
......	......	......	......	113	1.5	187	5.0	......	......	196	71
......	......	......	......	......	......	72	5.9	......	......	82	72
......	......	......	......	......	......	46	3.8	184	3.7	180	73
......	......	......	......	......	......	50	2.5	......	......	99	74
......	......	......	......	......	......	58	4.2	......	......	66	75
......	......	......	......	147	13.8	......	......	......	......	162	77
......	......	......	......	40	11.6	124	3.2	268	5.2	274	78
......	......	40	1.2	275	15.5	......	......	......	......	321	79
......	......	......	......	......	......	......	......	151	5.2	188	80
......	......	......	......	......	......	......	......	172	4.3	179	81
......	......	......	......	......	......	......	......	136	4.7	141	82
......	......	......	......	......	......	......	......	151	5.2	188	83
......	......	......	......	......	......	......	......	123	5.7	129	84
......	......	......	......	......	......	......	......	90	5.3	100	85
......	......	......	......	......	......	175	1.6	230	5.6	238	86
......	......	......	......	......	......	......	......	119	5.8	125	87
......	......	......	......	......	......	52	2.6	206	4.3	212	88
......	......	......	......	......	......	......	......	235	6.8	243	89
......	......	......	......	......	......	......	......	......	......	......	91
......	......	......	......	......	......	......	......	......	......	......	92
......	......	94	6.5	367	7.7	......	......	......	......	391	93
......	......	......	......	232	8.0	......	......	......	......	263	94
......	......	......	......	126	6.6	161	3.7	......	......	166	95
......	......	......	......	188	6.6	......	......	......	......	223	96
......	......	......	......	120	6.8	......	......	......	......	128	98
......	......	......	......	194	7.2	243	1.9	......	......	357	99
......	......	151	9.4	502	9.4	......	......	......	......	513	100
......	......	158	1.6	391	7.2	438	4.5	......	......	472	101
......	......	......	......	......	......	......	......	......	......	178	102

Detailed Records in Chapmanville District.

In Chapmanville District, no diamond drill tests have been made for coal. Several wells have been drilled for natural gas, but their records show only the approximate thickness of the coals and tell nothing about the slate partings. They are of value in showing what regions have underground coals and as a guide for future diamond drill prospecting. Such of these gas well records as could be obtained are published in Chapter VII.

Detailed Records in Logan District.

In Logan District, a large amount of diamond drill prospecting has been done, the summarized records of which are given on a previous page of this Chapter. The records of diamond drill holes Nos. 50 and 52A on Map II, by the Boone County Coal Corporation, and No. 68 on Map II, by the Dingess-Rum Coal Company, have been used in the geologic sections for Clothier and Ethel, respectively, and may be found there. The record of the Wood, Cole and Crane No. 3 (No. 100 Map II) has been used in the Pine Creek Section in Chapter VI. The records of a few of the other tests in Logan District could not be obtained, but the remainder, 42 records in all, are published in the following pages.

The summarized records of 26 tests just across the line in Washington and Crook Districts, Boone County, are published in the tables. The detailed records of these may be consulted in the report for Boone County.

The following record, furnished the Survey, along with several others, by J. C. Blair, General Manager, Boone County Coal Corporation, starts 15 feet below the Little Chilton coal:

Coal River Land Co., Coal Test No. 1 (51).

Logan District, on Spruce Fork, at Sharples. Authority, Coal River Land Co. Elevation, 845′ B.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	15	6	15	6		
Sandstone, Hernshaw	17	0	32	6		
Coal, Hernshaw	0	7½	33	1½	33′	1½″

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Slate	2	7½	35	9		
Sandstone	44	0	79	9		
Slate, sandy	1	8	81	5		
Sandstone	13	3	94	8		
Slate	8	9	103	5		
Sandstone	2	1	105	6		
Slate (should contain Dingess Limestone)	23	1½	128	7½		
Coal, Williamson	0	0½	128	8	95'	6½"
Slate, sandy	2	6	131	2		
Sandstone	21	11	153	1		
Slate, sandy	2	2	155	3		
Coal, bony	0	2	155	5		
Sandstone	6	9	162	2		
Slate, sandy, and sandstone	26	2	188	4		
Slate, shaly	26	3	214	7		
Slate, black	15	7½	230	2½		
Coal ......1' 4½" Slate .....0 4½ Coal ......1 5½ **Cedar Grove** (740' B)	3	1½	233	4	104'	9½"
Slate	0	9½	234	1½		
Sandstone	4	6½	238	8		
Bone and slate	0	1½	238	9½		
Slate and sandstone, Middle Cedar Grove	13	11½	252	8		
Coal, Lower Cedar Grove	1	3	253	11	20'	7"
Shale	9	10	263	9		
Slate and bone..0' 3 " Coal ....1 2 Slate ....1 4½ Coal ....2 9 Slate ....0 3 Coal ....0 3½ **Alma**	6	1	269	10	39'	6"
Slate	2	5	272	3		
Sandstone	7	0	279	3		
Slate, sandy, and sandstone	4	9	284	0		
Coal, Little Alma	1	5	285	5	15'	7"
Fire clay and slate	5	1	290	6		
Sandstone	9	6	300	0		
Sandstone, Peerless, and sandy slate	35	8	335	8		
Coal, Campbell Creek "Rider"	0	7	336	3		
Fire clay and sandy slate, to bottom	10	6	346	9		

Boone County Coal Corporation, Coal Test No. 5 (52).

Logan District, on Beech Creek, 1.5 miles S. 70° W. of Sharples. Authority, Boone County Coal Corporation. Elevation, 915' L.

	Thickness		Total	
	Ft.	In.	Ft.	In.
Surface	21	7	21	7
Sandstone	7	3	28	10
Shale	2	3	31	1
Slate, shaly	0	9	32	10

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Slate	0	8	33	6		
Slate (core lost)	1	0	34	6		
Coal (core lost) .1' 2½" Coal .1 2½ Bone .0 0½ Coal .3 5 } Chilton (875' L)	5	10½	40	4½	40'	4½"
Shale to bottom	2	7½	43	0		

Boone County Coal Corporation, Coal Test No. 6 (53).

Logan District, on Beech Creek, 2½ miles S. 80° W. of Sharples. Elevation, 1018' L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	21	0	21	0		
Sandstone, Lower Winifrede	32	10	53	10		
Shale	0	6	54	4		
Slate	0	9	55	1		
Sandstone	1	6	56	7		
Shale, sandy	3	0	59	7		
Slate	2	8	62	3		
Coal, Chilton "A"	0	2	62	5	62'	5"
Fire clay	1	0	63	5		
Slate, sandy	7	5	70	10		
Slate	4	9	75	7		
Slate, sandy	4	3	79	10		
Sandstone, Upper Chilton	9	7	89	5		
Slate, sandy	3	9	93	2		
Slate	0	6	93	8		
Slate, (lost)	1	8½	95	4½		
Coal ......4' 2½" Slate .....0 0½ Coal ......0 10 } Chilton	5	1	100	5½	38'	0½"
Shale, to bottom	2	6½	103	0		

The following record lacks only a few feet of reaching the Campbell Creek (No. 2 Gas) Coal:

Boone County Coal Corporation, Coal Test No. 11 (54).

Logan District, on Left Fork of Beech Creek, 1.8 miles S. 60° W. of Sharples. Authority, Boone County Coal Corporation. Elevation, 1010' B.

	Thickness		Total	
	Ft.	In.	Ft.	In.
Surface	9	0	9	0
Sandstone, Upper Chilton	28	4	37	4
Coal, Chilton "Rider"	0	2	37	6

			Thickness Ft.	In.	Total Ft.	In.		
Fire clay			1	0	38	6		
Shale, sandy			7	6	46	0		
Coal and bone, laminated			0	4	46	4		
Fire clay			0	7	46	11		
Sandstone			3	6	50	5		
Shale			2	0	52	5		
Slate, shaly			4	8	57	1		
Slate			1	6	58	7		
Bone	0' 2"							
Coal	0 11							
Slate	0 1							
Coal	3 9							
Slate	0 0¼							
Coal	0 0¼	Chilton						
Slate	0 0¼	(943' B)	8	3	66	10	66'	10"
Coal	0 4							
Slate	0 6¼							
Coal and bone, laminated	0 2							
Coal	0 4							
Slate	0 1							
Coal	0 10							
Fire clay			0	11	67	9		
Shale, sandy			7	10	75	7		
Sandstone			2	6	78	1		
Shale			3	1	81	2		
Slate			0	3	81	5		
Coal	0' 2"	Little Chilton						
Fire clay	1 0	(927' B)	1	9	83	2	16'	4"
Coal	0 7							
Fire clay			1	0	84	2		
Shale, sandy			4	7	88	9		
Sandstone	28' 0"	Hernshaw	36	5	125	2		
Sandstone	8 5							
Coal	0' 2"	Hernshaw						
Shale	4 5	(880' B)	4	11	130	1	46'	11"
Coal and bone	0 4							
Fire clay			0	7	130	8		
Shale, sandy			0	8	131	4		
Sandstone, Naugatuck			27	0	158	4		
Shale			0	7	158	11		
Sandstone			7	6	166	5		
Sandstone, Williamson			16	6	182	11		
Shale			15	0	197	11		
Sandstone			2	4	200	3		
Shale			3	4	203	7		
Sandstone, Upper Cedar Grove			51	10	255	5		
Coal and bone			0	2	255	7		
Sandstone			7	2	262	9		
Sandstone, coal streaks			1	0	263	9		
Shale, sandy			21	6	285	3		
Slate, dark			13	0	298	3		

		Thickness Ft.	In.	Total Ft.	In.		
Coal ....2' 0½" Slate ....0 1⅛ Coal and bone, laminated 0 3 Coal ....1 6 Fire clay ....0 7⅛ Coal and bone, laminated 0 2½ Fire clay.....0 8 Coal 0 1	Cedar Grove (706' B)	5	6	303	9	173'	8"
Shale, sandy		6	2	309	11		
Sandstone, Middle Cedar Grove		11	0	320	11		
Coal, Lower Cedar Grove		0	10	321	9		
Fire clay		1	0	322	9		
Shale		2	8	325	5		
Shale, sandy		14	6	339	11		
Sandstone, Lower Cedar Grove		9	0	348	11		
Slate		0	3	349	2		
Coal ....1' 0 " Sulphur .....0 0¼ Coal 2 6	**Alma (657' B)**	3	6¼	352	8¼	48'	11¼"
Fire clay		0	9¾	353	6		
Shale, sandy		0	7	354	1		
Sandstone, Logan		31	6	385	7		
Shale		2	5	388	0		
Coal, Little Alma		0	4	388	4		
Fire clay		1	0	389	4		
Shale		10	8	400	0		
Sandstone, Peerless		7	3	407	3		
Shale, sandy		27	9	435	0		

The following well starts 90 feet below the Chilton Coal.

Boone County Coal Corporation, Coal Test No. 3 (55).

Logan District, on Spruce Fork, 1.7 miles S. 45° E. of Sharples. Authority, Boone County Coal Corporation. Elevation, 880' B.

		Thickness Ft.	In.	Total Ft.	In.		
Surface		13	0	13	0		
Sandstone, Naugatuck		34	5	47	5		
Shale		1	0	48	5		
Sandstone .....8' 1" Shale ....0 6 Sandstone 7 6	Williamson	16	1	64	6		
Shale, sandy		7	0	71	6		
Slate, shaly		22	6	94	0		
Coal ....0' 8" Fire clay.......1 0 Coal 0 6	**Williamson (784' L.)**	2	2	96	2	96'	2"

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Fire clay	0	6	96	8		
Shale, sandy	6	8	103	4		
Slate	0	3	103	7		
Fire clay	1	0	104	7		
Sandstone .... 2' 0" Sandstone, with shale streaks ....16 5 } Upper Cedar Grove	18	5	123	0		
Shale, dark	3	0	126	0		
Shale, sandy	5	10	131	10		
Sandstone	2	1	133	11		
Shale	0	1	134	0		
Sandstone	2	0	136	0		
Shale, sandy	30	7	166	7		
Slate, black	10	10	177	5		
Coal, Cedar Grove	3	9	181	2	85'	0"
Shale	0	9	181	11		
Shale, sandy	3	10	185	9		
Slate, shaly	5	0	190	9		
Sandstone, Middle Cedar Grove	10	7	201	4		
Slate, shaly	2	1	203	5		
Coal, Lower Cedar Grove	1	3	204	8	23'	6"
Shale, sandy	8	9	213	5		
Sandstone	1	10	215	3		
Shale	2	6	217	9		
Sandstone	0	7	218	4		
Shale, sandy	2	4	220	8		
Shale	4	0	224	8		
Coal and bone, laminated.. 0' 4" Coal ....1 1 Sandstone .....0 2 Coal and bone..0 1 } **Alma**	1	8	226	4	21'	8"
Fire clay	1	0	227	4		
Shale, sandy	4	0	231	4		
Sandstone, Logan	20	2	251	6		
Shale	1	0	252	6		
Sandstone	0	3	252	9		
Shale	0	3	253	0		
Slate	0	2	253	2		
Coal, Little Alma	2	1	255	3	28'	11"
Shale, sandy, to bottom	2	9	258	0		

The following well also starts 90 feet below the Chilton Coal:

Coal River Land Co., Coal Test No. 2 (56).

Logan District, on Spruce Fork, 2.5 miles S. 45° E. of Seng. Authority, Coal River Land Co. Elevation, 1120' B.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.
Sand and cobble stones	14	7	14	7
Sandstone	47	8	62	3
Slate, shaly	35	2	97	5

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Sandstone	37	0	134	5		
Shale, slaty.........................	1	5	135	10		
Sandstone, Cedar Grove............	29	4	165	2		
Sandstone, with streaks of sandy slate	10	7	175	9		
Slate, sandy........................	12	2	187	11		
Coal, Cedar Grove..................	5	8	193	7	193'	7"
Shale, slaty..........................	6	7	200	2		
Sandstone, with streaks of sandy slate	34	6	234	8		
Sandstone	2	2	236	10		
Slate	0	7½	237	5½		
Coal ....1' 2½" Fire clay.....1 7 Coal and slate 0 2 Alma, upper bench	2	11½	240	5	46'	10"
Slate, with streaks of sandstone.....	9	7	250	0		
Sandstone	6	7	256	7		
Slate	0	1	256	8		
Coal ....0' 1" Slate ....0 2 Coal ....0 8 Alma, lower bench	0	11	257	7	17'	2"
Slate, black.........................	1	11	259	6		
Fire clay, sandy, to bottom	1	4	260	10		

The following is the record of a hole drilled on a high ridge so as to reach the upper coals of the Kanawha Series. The Boone County Coal Corporation No. 3 (55) well, published above, and situated ½ mile north of this well, shows the lower coals. There is an interval of about 140 feet between the two records that should contain the Chilton as well as other smaller coals:

Boone County Coal Corporation, Coal Test No. 6 (57).

Logan District, between Garland and Brushy Forks of Spruce, 3 miles S. 35° E. of Seng. Authority, Boone County Coal Corporation. Elevation, 1880' B.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface	8	0	8	0		
Sandstone, Clarion..................	20	0	28	0		
Coal, Clarion........................	1	6	29	6	29'	6"
Shale	2	0	31	6		
Sandstone, Homewood...............	116	11	148	5		
Coal ....2' 0" Fire clay.......0 7 Shale ....1 1 Coal and bone..0 2 Shale ....2 8 Coal and bone..0 6 Stockton ... (1785' B.)	7	0	155	5	125'	11"
Shale	3	2	158	8		
Sandstone	2	1	160	9		

				Thickness		Total			
				Ft.	In.	Ft.	In.		
Shale, with sandstone streaks				1	10	162	7		
Sandstone, broken, Upper Coalburg				55	2	217	9		
Shale, broken				20	10	238	7		
Shale				10	6	249	1		
Sandstone				9	0	258	1		
Coal and bone,			Coalburg	12	3	270	4	114'	11"
Slate	0	9							
laminated	2'	7"							
Coal and bone, laminated	2	2							
Shale	0	2							
Coal	0	1							
Fire clay	0	5							
Coal	0	1							
Fire clay	0	7							
Coal	0	1							
Fire clay	0	2							
Sandstone	3	6							
Coal and bone	1	8							
Sandstone				55	3	325	7		
Coal, Buffalo Creek				0	3	325	10		
Fire clay				0	7	326	5		
Sandstone				4	3	330	8		
Shale, with sandstone streaks				6	5	337	1		
Sandstone				4	7	341	9		
Sandstone, with shale streaks				7	5	349	2		
Sandstone				18	4	367	6		
Shale				2	3	369	9		
Coal and bone	0'	2"	local	1	8	371	5	100'	1"
Coal	0	9							
Coal and bone	0	5							
Coal	0	4							
Shale				10	8	382	1		
Sandstone				32	9	414	10		
Shale				0	6	415	4		
Coal and bone	0'	5	local	8	8	424	0	52'	7"
Fire clay	0	8							
Coal and bone	0	5							
Shale, with sandstone streaks	6	8							
Coal and bone	0	6							
Fire clay				1	0	425	0		
Sandstone				18	3	443	3		
Coal, local				0	6	443	9		
Fire clay				1	8	445	6		
Sandstone, Upper Winifrede				31	4	476	10		
Bone	0'	1"	Winifrede (1400' B.)	4	2	481	0	57'	0"
Coal	0	9							
Shale	0	6							
Coal	0	8							
Bone	0	0½							
Coal	0	6½							
Slate	0	3							
Coal	0	9							
Shale	0	2							
Coal	0	5							

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Fire clay	2	0	483	0		
Shale	2	0	485	0		
Sandstone, Lower Winifrede	42	3	527	3		
Shale, with sandstone, streaks to bottom	1	9	529	0	48′	0″

The following well starts almost flush with the horizon of the Chilton Coal, 20 to 30 feet geologically below the bottom of boring No. 59 on Map II, located ½ mile northeastward:

Boone County Coal Corporation, Coal Test No. 5 (58).

Logan District, on Laurel Fork, 4½ miles S. 58° E. of Seng. Authority, Boone County Coal Corporation. Elevation, 1385′ B.

				Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface				15	0	15	0		
Sandstone, Lower Chilton				62	6	77	6		
Coal	0′	7″	Little Chilton	0	11	78	5	78′	5″
Bone	0	2							
Coal	0	2							
Fire clay				1	0	79	5		
Shale, sandy				6	0	85	5		
Sandstone, Hernshaw				16	10	102	3		
Shale				2	2	104	5		
Coal	1′	0″	Hernshaw	9	6	113	11	35′	6″
Shale	8	0							
Coal and bone	0	6							
Shale				1	1	115	0		
Sandstone, Naugatuck				45	0	160	0		
Shale				50	4	210	4		
Coal	0′	6″	Williamson	25	3	235	7	121′	8″
Shale	7	0							
Coal	0	7							
Fire clay	1	6							
Shale	9	10							
Coal	0	7							
Sandstone	1	4							
Shale	1	0							
Coal	0	5							
Shale	2	0							
Coal and bone	0	6							
Shale				1	3	236	10		
Fire clay				1	0	237	10		
Shale				17	0	254	10		
Sandstone, with slate streaks	16′	0″	Upper Cedar Grove	23	10	278	8		
Shale, sandy	2	6							
Sandstone	5	4							
Shale				13	10	292	6		

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Coal 1' 5"						
Sulphur 0 0½						
Coal 0 2						
Shale 0 1½						
Coal 2 5½						
Bone 0 0¼						
Coal 1 7¼						
Coal and sulphur 0 3						
Cedar Grove (1085' B.)	6	1	298	7	63'	0"
Fire clay	1	1	299	8		
Shale, sandy	1	9	301	5		
Sandstone, with shale streaks	1	7	303	0		

The following is the record of a test made ½ mile northeast of the one just given. Its record stops 5 to 10 feet above the Chilton Coal and fails by that interval to reach the level at which test No. 58 starts, so that the Chilton Coal is not shown by either test:

Boone County Coal Corporation, Coal Test No. 3 (59).

Logan District, 2.9 miles north of Stow, on Logan-Boone County Line. Elevation, 1920' B.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface	5	0	5	0		
Sandstone, red	22	0	27	0		
Coal and bone, Lower Clarion?	2	6	29	6	29'	6"
Fire clay	1	0	30	6		
Sandstone, Homewood	71	3	101	9		
Shale	0	4	102	1		
Coal and bone, Stockton	1	6	103	7	74'	1"
Fire clay	0	8	104	3		
Sandstone	34	7	138	10		
Shale	0	1	138	11		
Coal	0	2	139	1	35'	6"
Fire clay	1	6	140	7		
Sandstone	12	0	152	7		
Shale, sandy	2	9	155	4		
Sandstone, Upper Coalburg	50	11	206	3		
Shale	1	0	207	3		
Sandstone	0	9	208	0		
Slate, with coal streaks 2' 3"						
Sandstone, with coal streaks 1 6						
Coalburg	3	9	211	9	72'	8"
Sandstone	47	3	259	0		
Shale	0	3	259	3		
Sandstone	13	10	273	1		
Coal 0' 1"						
Shale 1 1						
Coal 0 7						
Shale 9 6						
Coal 0 8						
Little Coalburg	11	11	285	0	73'	3"

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Fire clay		1	0	286	0		
Sandstone, Lower Coalburg		54	8	340	8		
Coal 0' 3" Sandstone 0 8 Coal 0 2	**Buffalo Creek**	1	1	341	9	56'	9"
Fire clay		2	0	343	9		
Sandstone, Upper Winifrede		37	9	381	6		
Sandstone, with coal streaks 2' 8" Slate 0 10 Coal 0 4	**Winifrede** (1830' B.)	3	5	384	11	43'	2"
Shale, sandy		3	6	388	5		
Slate		14	1	402	6		
Sandstone		3	6	406	0		
Shale		2	10	408	10		
Coal 0' 3" Coal and bone 0 5		0	8	409	6	24'	7"
Sandstone		21	2	430	8		
Coal and bone		0	10	431	6	22'	0"
Shale, sandy		1	8	433	2		
Sandstone, Lower Winifrede		33	4	466	6		
Coal 0' 2" Shale 3 6 Coal 0 10 Fire clay 0 6 Shale 1 9 Coal 1 0	**Chilton "A"**	7	9	474	3	42'	9"
Shale		3	5	477	8		
Sandstone		1	5	479	1		
Shale		4	9	483	10		
Fire clay		5	2	489	0		
Shale, sandy		15	10	504	10		
Fire clay		1	6	506	4		
Shale, sandy		13	3	519	7		
Sandstone		4	3	523	10		
Coal, Chilton "Rider"		0	3	524	1	49'	10"
Shale		3	0	527	1		
Sandstone, to bottom		12	11	540	0	15'	11"

Sixteen core tests have been made in the Dingess Run region east of Logan. The following 11 records, furnished the Survey by W. C. McCall of the W. G. Wilkins Co. of Logan, W. Va., show considerable data on the Chilton, Cedar Grove, Alma, and intermediate Coals. Only one of these records pierced the Campbell Creek Coal and none was located high enough on the hills to show the Coalburg and other high coals of the Kanawha Series:

Dingess-Rum Coal Co., Coal Test No. 7 (61).

miles east of Ethel. Authority, Dingess-Rum Coal Co. Completed Dec. 21, 1908. Elevation, 1082' L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface and boulders	18	6	18	6		
Sandstone	27	0	45	6		
Shale, sandy	3	2	48	8		
Fire clay	2	0	50	8		
Slate, gray	1	9	52	5		
Fire clay	0	5	52	10		
Coal	0	1	52	11		
Shale, sandy	12	11	65	10		
Sandstone, Upper Chilton	18	6	84	4		
Coal ....0' 2" Fire clay.......1 7 Coal ....1 4 Bone and coal..0 3 Coal ....1 5 Chilton, upper bench. (993' L.)	4	9	89	1	89'	1"
Shale, sandy	4	4	93	5		
Coal, clean, Chilton, lower bench (986' L.)	3	1	96	6	7'	5"
Slate, black	0	2	96	8		
Fire clay, impure	1	6	98	2		
Shale, sandy	2	3	100	5		
Bone ....0' 1" Coal ....0 9 Little Chilton....... (981' L.)	0	10	101	3	4'	9"
Fire clay, impure, to bottom	7	1	108	4		

Dingess-Rum Coal Co., Coal Test No. 6 (62).

Logan District, on Dingess Run, at the mouth of Rockcamp Branch, 2.2 miles S. 85° E. of Ethel. Authority, Dingess-Rum Coal Co. Completed Dec. 6, 1908. Elevation, 1056' L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Sand and gravel	34	6	34	6		
Sandstone, Upper Chilton	19	10	54	4		
Coal ....0' 3" Fire clay......1 1 Coal ....3 1 Chilton, upper bench.. (997' L.)	4	5	58	9	58'	9"
Fire clay	0	2	58	11		
Shale, sandy	4	8	63	7		
Slate, gray	1	7	65	2		
Coal ....3' 4" Fire clay and coal ....0 2 Fire clay.......0 2 Bone ....0 1 Chilton, lower bench... (987' L.)	3	9	68	11	10'	2"
Fire clay	1	4	70	3		
Shale, sandy, to bottom	3	3	73	6		

Dingess-Rum Coal Co., Coal Test No. 1 (64).

Logan District, on Rockcamp Branch of Dingess Run, 2.8 miles S 60° E. of Ethel. Authority, Dingess-Rum Coal Co. Elevation, 1140' L.

		Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface		23	6	23	6		
Sandstone, coal partings, Upper Chilton		18	2	41	8		
Shale		1	0	42	8		
Coal, Chilton "Rider"		0	2	42	10		
Shale		23	6	66	4		
Coal, bony.....0' 2"	Chilton	6	10	73	2	73'	2"
Coal 6 8	(1067' L.)						
Shale, soft		1	0	74	2		
Sandstone. Lower Chilton		35	6	109	8		
Shale, dark		1	1	110	9		
Coal ....0' 6"	Little						
Shale 1 6	Chilton	2	6	113	3	40'	1"
Bony coal......0 6							
Clay, bastard		3	5	116	8		
Sandstone, Hernshaw		29	4	146	0		
Coal ....0' 4"	Hernshaw						
Shale 2 2	(991' L.)	2	11	148	11	35'	8"
Coal 0 5							
Shale		5	6	154	5		
Sandstone, Naugatuck		28	2	182	7		
Slate		15	3	197	10		
Sandstone, Williamson		8	2	206	0		
Shale (should contain Dingess Limestone)		24	9	230	9		
Coal, Williamson		0	1	230	10	71'	11"
Sandstone ....22' 4"	Upper Cedar						
Slate 8 0	Grove	63	8	294	6		
Sandstone 33 4							
Slate		2	2	296	8		
Sandstone		10	3	306	11		
Slate		16	7	323	6		
Coal ....0' 7"							
Bone 0 3	Cedar Grove	8	11	332	5	101'	7"
Slate 4 10							
Coal 3 3							
Shale		15	7	348	0		
Sandstone .....1' 1"	Middle						
Shale, sandy...0 8	Cedar Grove	7	2	355	2		
Sandstone 5 5							
Bone coal......0' 3"	Lower						
Coal 1 10	Cedar Grove	2	1	357	3	24'	10"
Sandstone and shale, dark		10	0	367	3		
Sandstone, Lower Cedar Grove		22	5	389	8		
Shale, dark		1	4	391	0		

				Thickness		Total			
				Ft.	In.	Ft.	In.		
Coal	0′	3″	Alma (744′ L.)	5	0	396	0	38′	9″
Bone	0	2							
Coal	1	0							
Bone	0	2							
Coal	0	3							
Slate and coal	1	2							
Coal	2	0							
Slate, to bottom				2	0	398	0		

Dingess-Rum Coal Co., Coal Test No. 2 (67).

Logan District, on Freeze Fork of Dingess Run, 1.7 miles S. 50° E. of Ethel. Authority, Dingess-Rum Coal Co. Elevation, 1095′ L.

				Thickness		Total			
				Ft.	In.	Ft.	In.		
Surface				30	0	30	0		
Shale				9	5	39	5		
Bone	0′	1″	Chilton "A"	1	11	41	4	41′	4″
Coal	1	3							
Bone and shale	0	7							
Fire clay				1	0	42	4		
Sand shale				4	9	47	1		
Sandstone, Upper Chilton				35	6	82	7		
Sand shale				0	11	83	6		
Sandstone				2	0	85	6		
Shale				4	8	90	2		
Bone and coal, "Chilton Rider"				1	0	91	2		
Sand shale				10	9	101	11		
Fire clay				1	5	103	4		
Shale				1	8	105	0		
Slate				2	0	107	0		
Coal and bone	0′	1″	Chilton, upper bench	4	9	111	9	70′	5″
Coal	1	5							
Sandstone	2	2							
Coal	1	1							
Shale				13	6	125	3		
Sandstone				7	10	133	1		
Slate				0	5	133	6		
Coal	3′	4″	Chilton, lower bench (957′ L.)	4	9	138	3	26′	6″
Bone	0	3							
Coal	1	2							
Shale, to bottom				1	8	139	11		

Dingess-Rum Coal Co., Coal Test No. 1 (69).

Logan District, on Righthand Fork of Dingess Run, 1.6 miles south of Ethel. Authority, Dingess-Rum Coal Co. Elevation, 995′ B.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Sandstone, Upper Chilton	25	0	25	0		
Coal, with partings, Chilton	3	7	28	7	28′	7″
Unrecorded	220	5	249	0		

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Coal, Cedar Grove, (744' B.)	2	0	251	0	232'	5"
Fire clay	1	0	252	0		
Sandstone, Middle Cedar Grove	40	11	292	11		
Coal, Lower Cedar Grove	2	2	295	1		
Fire clay, to bottom	2	11	298	0		

The following is the record of a boring that starts, according to Hennen, 175 feet, hand-level measurement, below the Chilton Coal:

Dingess-Rum Coal Co., Coal Test No. 4 (70).

Logan District, on Dingess Run, at Fort Branch. Authority, Dingess-Rum Coal Co. Elevation, 716' L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface	17	0	17	0		
Sandstone, Upper Cedar Grove	3	0	20	0		
Sand shale	13	6	33	6		
Sand shale, dark	6	11	40	5		
Shale, gray	3	5	43	10		
Sand shale, dark	5	6	49	4		
Coal, very soft, Cedar Grove (665' L.)	1	6	50	10	50'	10"
Fire clay, impure	2	0	52	10		
Sand shale	1	4	54	2		
Sandstone, Middle Cedar Grove	40	5	94	7		
Slate, black	0	1	94	8		
Bone 0' 1" Coal, very soft 2 3 Lower Cedar Grove	2	4	97	0	46'	2"
Sand shale	5	2	102	2		
Fire clay, impure	0	9	102	11		
Sand shale	20	10	123	9		
Sandstone, Lower Cedar Grove	5	7	129	4		
Sand shale, dark	4	10	134	2		
Sandstone	0	2	134	4		
Slate, black	0	1	134	5		
Coal 0' 7" Fire clay, impure 0 5 Coal 4 1 Alma (576' L.)	5	1	139	6	42'	6"
Sand shale, dark, to bottom	3	0	142	6		

Dingess-Rum Coal Co., Coal Test No. 5 (71).

Logan District, on Fort Branch of Dingess Run, 0.4 mile N. 60° W. of Fort Branch. Authority, Dingess-Rum Coal Co. Elevation, 789' L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.
Surface	13	0	13	0
Sandstone, Upper Cedar Grove	69	10	82	10
Sand shale	17	6	100	4
Slate, gray	12	4	112	8

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Coal, very soft, Cedar Grove		1	6	114	2	114′	2″
Fire clay, impure		1	2	115	4		
Sand shale		4	3	119	7		
Sandstone, Middle Cedar Grove		40	0	159	7		
Sand shale, dark		1	1	160	8		
Sandstone		1	0	161	8		
Slate, gray		1	2	162	10		
Slate, black		0	1	162	11		
Coal, Lower Cedar Grove (623′ L.)		2	5	165	4	51′	2″
Fire clay, impure		1	9	167	1		
Shale, gray		6	0	173	1		
Fire clay		0	4	173	5		
Slate, gray		3	8	177	1		
Coal, Alma "A"		0	1	177	2	11′	10″
Fire clay, impure		2	0	179	2		
Sand shale		5	10	185	0		
Slate, gray		1	10	186	10		
Coal ....0′ 6″ Slate, gray.....0 6 Coal ....1 1 Slate, black.....0 5 Coal 2 6	**Alma (596′ L.)**	5	0	191	10	14′	8″
Sand shale, dark		3	8	195	6		

The following bore hole starts flush with the Cedar Grove Coal:

Dingess-Rum Coal Co., Coal Test No. 3 (72).

Logan District, on Dingess Run, 0.5 mile east of Stollings. Authority, Dingess-Rum Coal Co. Completed in September, 1908. Elevation, 670′ L.

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Sandstone, Middle Cedar Grove		33	8	33	8		
Coal, Lower Cedar Grove, (634′ L.)		2	6	36	2	36′	2″
Sand shale, dark		9	5	45	7		
Slate, gray		0	8	46	3		
Coal, Alma "A"		0	1	46	4		
Fire clay		0	6	46	10		
Sand shale		20	2	67	0		
Sand		5	1	72	1		
Coal and bone 0′ 6 ″ Fire clay.....0 10 Coal ....1 2½ Fire clay.....0 7½ Coal ....2 8 Bone and coal 0 1	**Alma (592′ L.)**	5	11	78	0	41′	10″
Fire clay		1	10	79	10		
Sand shale, dark, to bottom		1	10	81	8		

Dingess-Rum Coal Co., Coal Test No. 2 (73).

Logan District, on Dingess Run, 0.3 mile southeast of Stollings. Authority, Dingess-Rum Coal Co. Elevation, 660′ B.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	8	6	8	6		
Sandstone, Middle Cedar Grove	5	0	13	6		
Coal, Lower Cedar Grove	2	6	16	0	16′	0″
Fire clay	1	0	17	0		
Shale, sandy	29	1	46	1		
Coal ....0′ 9″ Slate, dark.....0 1 Coal and bone..1 8 Fire clay.......1 1 Coal ....0 8 **Alma (610′ B.)**	3	10	49	11	33′	11″
Sand and shale	2	0	51	11		
Sand, Logan	86	7	138	6		
Coal, Little Alma	0	4	138	10	88′	11″
Shale, sandy	44	6	183	4		
Sand	0	6	183	10		
Coal, Campbell Creek (No. 2 Gas) (472′ B.)	3	8	187	6	47′	8″
Fire clay, to bottom	2	0	189	6		

Dingess-Rum Coal Co., Coal Test No. 2 (74).

Logan District, on Guyandot River, at Stollings. Authority, Dingess-Rum Coal Co. Completed in September, 1908. Elevation, 663′ L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Earth	6	6	6	6		
Sandstone, Middle Cedar Grove	4	6	11	0		
Coal, very soft, Lower Cedar Grove	3	5	14	5	14′	5″
Fire clay, impure	6	6	21	1		
Sand shale	12	5	33	6		
Fire clay	3	6	37	0		
Sand shale	4	8	41	8		
Coal, Alma "A"	0	1	41	9		
Sand shale	8	0	49	9		
Coal, bone, and sand shale, Alma, (611′ L.)	2	6	52	3	37′	10″
Sandstone, Logan, to bottom	46	9	99	0		

Dingess-Rum Coal Co., Coal Test No. 1 (75).

Logan District, on the Guyandot River at the mouth of Lawson Branch, at Stollings. Authority, Dingess-Rum Coal Co. Completed in August, 1908. Elevation, 680.1′ L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Earth	16	8	16	8		
Sandstone, Middle Cedar Grove	6	0	22	8		
Coal, very soft, Lower Cedar Grove	2	7	25	3	25′	3″
Shale, gray	1	0	26	3		

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Sand shale	6	11	33	2		
Slate, gray	3	10	37	0		
Sand shale	10	0	47	0		
Fire clay	3	10	50	10		
Slate, black	6	8	57	6		
Coal, Alma (618′ L.)	4	3	61	9	36′	6″
Fire clay	0	4	62	1		
Sand shale, to bottom	3	8	65	9		

The 7 following records are those of borings made along or near the Guyandot River between Dingess Run and Rum Creek. Most of them penetrate the Campbell Creek or No. 2 Gas Coal, showing it in good thickness.

The first boring starts, according to Hennen, 115 feet, aneroid measurement, below the Chilton Coal:

Robert Lawson Coal Test No. 2 (77).

Logan District, on Lick Branch of Guyandot River, 0.6 mile southeast of McConnell. Authority, Logan Mining Co. Completed May 30, 1913. Elevation, 812′ L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface	4	0	4	0		
Slate	10	0	14	0		
Shale, sandy	8	0	22	0		
Slate	33	0	55	0		
Sandstone with pebbles, Williamson	5	2	60	2		
Sand shale	1	0	61	2		
Sandstone	1	0	62	2		
Coal, Williamson (748′ L.)	1	11	64	1	64′	1″
Fire clay, sandy	0	10	64	11		
Sandstone, dark	3	3	68	2		
Sandstone	2	0	70	2		
Shale, sandy	6	6	76	8		
Sandstone	2	6	79	2		
Shale	13	10	93	0		
Shale, sandy	11	0	104	0		
Sandstone	2	0	106	0		
Shale, sandy	21	0	127	0		
Slate	2	0	129	0		
Slate, sandy	2	0	131	0		
Slate	3	6	134	6		
Slate, sandy	3	6	138	0		
Slate	9	0	147	0		
Coal 1′ 0″ Slate 5 7 Coal 2 7½ Slate 0 7½ Coal 4 0 } Cedar Grove (651′ L.)	13	10	160	10	96′	9″
Slate	1	0	161	10		
Sandstone, to bottom	0	6	162	4		

John A. Sheppard et al., Coal Test No. 1 (78).

Logan District, on Beech Branch of Guyandot River, 1.1 miles N. 80° W. of Rolfe. Authority, John A. Sheppard et al. Elevation, 760' B.

	Thickness Ft.	In.	Total Ft.	In.		
Surface	7	0	7	0		
Shale, dark	13	6	20	6		
Sandstone and shale, Upper Cedar Grove	12	0	32	6		
Shale, dark	7	0	39	6		
Coal 0' 4" Shale, dark 8 4 Coal 2 11 } Cedar Grove (709' B.)	11	7	51	1	51'	1"
Shale	1	0	52	1		
Sandstone, coal partings, Middle Cedar Grove	24	3	76	4		
Coal 0' 4" Slate 0 3 Coal 4 5 } Lower Cedar Grove	5	0	81	4		
Shale, soft	3	2	84	6		
Sandstone and shale, Lower Cedar Grove	6	2	90	8		
Sandstone	2	4	93	0		
Shale	10	2	103	2		
Sandstone	3	2	106	4		
Coal 0' 5" Bone coal 0 1 Coal 0 1 Bone 0 2½ Coal 0 7 Bone and coal 0 3 Coal 0 7 } Alma "A"	2	2½	108	6½	57'	5½"
Shale	2	6	111	0½		
Sandstone	4	9½	115	10		
Shale	8	2	124	0		
Coal, Alma, (633' B.)	3	2	127	2	18'	8"
Shale	3	0	130	2		
Sandstone, Logan	71	6	201	8		
Shale	7	2	208	10		
Coal, Little Alma	0	8	209	6	82'	4"
Shale	26	0	235	6		
Sandstone, Peerless	32	6	268	0		
Coal, Campbell Creek (No. 2 Gas)	5	1½	273	1½		
Shale	0	10½	274	0		

Robert Lawson Coal Test No. 3 (79).

Logan District, on Beech Branch of Guyandot River, 1.2 miles S. 80° W. of Rolfe. Authority, Logan Mining Co. Elevation, 1015' B.

	Thickness Ft.	In.	Total Ft.	In.
Sandstone, Hernshaw	16	0	16	0
Shale, dark	4	6	20	6
Sandstone	2	8	23	2

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Shale, dark		17	2	40	4		
Bone and coal, Hernshaw		1	3	41	7	41′	7″
Sandstone, Naugatuck		72	5	114	0		
Coal and bone, Dingess		1	10	115	10	74′	3″
Slate, sandy		5	0	120	10		
Sandstone, Williamson		47	0	167	10		
Sand shale		36	0	203	10		
Sandstone, Upper Cedar Grove		42	0	245	10		
Coal and bone, Cedar Grove "Rider"		0	6	246	4		
Sand shale		28	8	275	0		
Coal .... 0′ 8″ **Black slate..12 7** **Coal .... 1 8** **Bone coal.... 0 2½** **Slate .... 0 4** **Bone coal... 0 1**	**Cedar Grove**	15	6½	290	6½	174′	8½″
Slate		0	4	290	10½		
Sandstone, Lower Cedar Grove		24	5	315	3½		
Coal, Alma		1	11	317	2½		
Slate, to bottom		3	4	320	6½	30′	0″

John A. Sheppard et al. Coal Test No. 4 (80).

Logan District, on the Guyandot River, 0.7 mile east of McConnell. Authority, John A. Sheppard et al. Elevation, 685′ B.

		Thickness		Total			
		Ft.	In.	Ft.	In.		
Surface		40	0	40	0		
Shale		12	10	52	10		
Coal, Alma, (629′ B.)		2	11	55	9	55′	9″
Shale		2	0	57	9		
Sandstone, Logan		80	2	137	11		
Coal ....0′ 3″ Shale ....3 1 Coal 0 5	**Little Alma**	3	9	141	8	85′	11″
Shale		3	3	144	11		
Sandstone ....29′ 1″ Shale .... 5 11 Sandstone 7 10	**Peerless**	42	10	187	9		
Shale		0	8½	188	5½		
Coal ....1′ 5″ Slate ....0 1 Coal 2 4	**Campbell Creek (No. 2 Gas)** (493′ B.)	3	10	192	3½	50′	7½″
Fire clay		0	6	192	9½		
Slate, to bottom		2	4	195	1½		

John A. Sheppard et al. Coal Test No. 5 (81).

Logan District, on the Guyandot River, 1.0 mile east of McConnell. Authority, John A. Sheppard et al. Elevation, 690′ B.

	Thickness		Total	
	Ft.	In.	Ft.	In.
Surface	38	1	38	1
Sandstone, Logan	38	10	76	11

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Shale, brown	1	10	78	9		
Sandstone, gray	6	10	85	7		
Shale	0	6	86	1		
Sandstone	11	7	97	8		
Shale, blue, with pebbles	12	0	109	8		
Coal, Little Alma (580′ B.)	0	6	110	2	110′	2″
Shale, blue	1	10	112	0		
Shale, sandy	5	7	117	7		
Sandstone, Peerless	41	4	158	11		
Slate and shale	4	0	162	11		
Sandstone	2	10	165	9		
Slate	0	7	166	4		
Shale, sandy	2	1	168	5		
Slate, sandy	1	1	169	6		
Shale	0	2	169	8		
Sandstone, slaty	2	0	171	8		
Slate, blue	0	2	171	10		
Coal, slaty.....0′ 3″ } Campbell Creek						
Coal ....4 1 } (514′ B)	4	4	176	2	66′	0″
Slate, blue	1	3	177	5		
Sandstone, to bottom	1	1	178	6		

The following is the record of a test that starts 25 to 30 feet below the Lower Cedar Grove Coal:

John A. Sheppard et al. Coal Test No. 2 (82).

Logan District, on the Guyandot River, 0.6 mile N. 10° W. of Rolfe. Authority, John A. Sheppard, et al. Elevation, 675′ B.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	18	4	18	4		
Sandstone, coarse, gray, Logan	25	1	43	5		
Shale, sandy, bluish	5	3	48	8		
Sandstone, fine	8	8	57	4		
Shale, sandy, gray	5	2	62	6		
Coal, Little Alma, (612′ B)	0	2	62	8	62′	8″
Sandstone, slaty, blue	6	6	69	2		
Sandstone, gray, medium grained, Peerless	59	5	128	7		
Shale, blue	2	5	131	0		
Sandstone, blue	1	2	132	2		
Slate, sandy	0	5	132	7		
Slate, lead colored	2	5	135	0		
Draw slate	0	10½	135	10½		
Coal, Campbell Creek (No. 2 Gas)	4	8½	140	7		
Fire clay, to bottom	0	5	141	0	78′	4″

The following well was located near the last one, but shows deeper strata:

John A. Sheppard et al. Coal Test No. 3 (83).

Logan District, on the Guyandot River, 0.5 mile N. 10° W. of Rolfe. Authority, John A. Sheppard, et al.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	20	4	20	4		
Shale, yellow	3	0	23	4		
Sandstone, Logan	56	4	79	8		
Shale	4	4	84	0		
Coal, Little Alma	0	5	84	5	84'	5"
Shale, sandy	4	7	89	0		
Sandstone, Peerless	58	4	147	4		
Shale	3	8	151	0		
Coal, Campbell Creek (No. 2 Gas.)	5	3	156	3	71'	10"
Shale and fire clay	3	0	159	3		
Sandstone, Brownstown	11	0	170	3		
Bone coal 0' 8" Shale 8 6 Coal 0 7 **Powellton "A"**	9	9	180	0		
Shale	2	2	182	2	25'	11"
Sandstone, to bottom	5	7	187	9		

The 5 following records are from wells drilled on the waters of Rum Creek. All of them show the Campbell Creek Coal in good development, but the Alma does not seem good in the three borings made through its horizon:

Dingess-Rum Coal Co. Coal Test No. 2 (84).

Logan District, on Rum Creek, at Rolfe. Authority, Dingess-Rum Coal Co. Elevation, 681' L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	17	3	17	3		
Sandstone, Logan	24	0	41	3		
Shale	31	6	72	9		
Sandstone, Peerless	42	8	115	5		
Shale	7	3	122	8		
Bone coal 0' 2" Coal 5 6 **Campbell Creek (No. 2 Gas)** (552' L.)	5	8	128	4	128'	4"
Shale	0	3	128	7		

The above boring starts, according to Hennen, 70 feet below an opening in the Lower Cedar Grove Coal on the land of W. D. Chambers.

Dingess-Rum Coal Co. Coal Test No. 1 (85).

Logan District, on Rum Creek, at the mouth of Righthand Fork, 1.3 miles east of Rolfe. Authority, Dingess-Rum Coal Co. Elevation, 743.5′ L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	8	6	8	6		
Shale	17	8	26	2		
Sandstone, Peerless	61	3	87	5		
Shale	2	10	90	3		
Coal, Campbell Creek (No. 2 Gas), (648′ L.)	5	4	95	7	95′	7″
Shale	0	5	96	0		
Sandstone, Brownstown	4	0	100	0		

The above well starts, according to Hennen, 50 feet below the crop of the Alma Coal.

The following boring starts 10 to 20 feet below the top of the Logan Sandstone:

Dingess-Rum Coal Co. Coal Test No. 4 (87).

Logan District, on Rum Creek, at the mouth of second Righthand Fork, 2.5 miles east of Rolfe. Authority, Dingess-Rum Coal Co. Elevation, 819′ L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	9	6	9	6		
Sandstone, Logan	23	0	32	6		
Shale	27	6	60	0		
Coal, Little Alma	0	4	60	4	60′	4″
Sandstone, Peerless	55	10	116	2		
Shale	2	6	118	8		
Coal, Campbell Creek, (No. 2 Gas) (695′ L.)	5	10	124	6	64′	2″
Fire clay, to bottom	0	10	125	4		

The following boring starts flush with the base of the Cedar Grove Coal, according to Hennen:

Dingess-Rum Coal Co. Coal Test No. 3 (88).

Logan District, on Rum Creek, at the mouth of North Mudlick Branch, 1.3 miles S. 70° W. of Yolyn. Authority, Dingess-Rum Coal Co. Elevation, 877′ L.

	Thickness		Total	
	Ft.	In.	Ft.	In.
Sandstone, Middle Cedar Grove	31	2	31	2
Shale	5	9	36	11

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Coal ....1' 11" Shale ....0 3 Coal ....0 2 } Lower Cedar Grove..	2	4	39	3	39'	3"
Shale	8	5	47	8		
Sandstone, Lower Cedar Grove.......	4	5	52	1		
Coal, Alma..........................	2	7	54	8	15'	5"
Shale	26	4	81	0		
Sandstone, Logan....................	73	6	154	6		
Coal ....0' 2" Shale ....0 4 Coal ....0 8 } Little Alma..	1	2	155	8	101'	0"
Shale	7	6	163	2		
Sandstone, Peerless.................	43	0	206	2		
Shale	0	3	206	5		
Coal ....2' 7" Band ....0 2 Coal ....1 7 } Campbell Creek (No. 2 Gas)..	4	4	210	9	55'	1"
Fire clay, to bottom................	1	5	212	2		

The following boring starts flush with the base of an opening in the Cedar Grove Coal, according to Hennen:

Dingess-Rum Coal Co. Coal Test No. 5 (89).

Logan District,, on Second Righthand Branch of Rum Creek, 1.4 miles S. 30° W. of Yolyn. Authority, Dingess-Rum Coal Co. Elevation, 939' L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Shale	7	0	7	0		
Sandstone, Middle Cedar Grove.....	53	0	60	0		
Shale	5	1	65	1		
Bone and coal..0' 7" Shale ....2 7 Coal ....2 7 Shale ....2 3 Coal ....2 5 Band ....0 2 Coal ....0 5 Bone ....0 4 } Lower Cedar Grove (862' L)	11	4	76	5	76'	5"
Shale	27	7	104	0		
Sandstone, Logan....................	51	0	155	0		
Shale	29	2	184	2		
Coal, Little Alma...................	0	6	184	8	108'	3"
Sand shale..........................	24	2	208	10		
Sandstone ..... 8' 9" Shale ....10 0 Sandstone .... 7 4 } Peerless	26	1	234	11		
Shale	0	5	235	4		
Coal ....6' 4" Band ....0 2 Coal ....0 3 } Campbell Creek (No. 2 Gas).. (697' L.)	6	9	242	1	57'	5"
Shale, to bottom....................	1	2	243	3		

The United States Coal and Oil Company of Holden, W. Va., has bored six coal test holes on the waters of Island Creek. The logs of two of these on Copperas Mine Fork were not secured, but those of the four following, all located on Whitman Creek, were furnished the Survey by Paul Hardy, General Manager of the company. All four of them show the Cedar Grove Coal in good development and one was drilled through the Alma, but, unfortunately, none of them reached the Campbell Creek. It is probable that a large amount of this coal will be found along the Coalburg Syncline between the Guyandot River and Tug Fork of Big Sandy, since its presence is proved at both localities mentioned.

The following record shows that the Chilton Coal is split with too many partings to be of value:

United States Coal & Oil Co., Coal Test No. 3 (93).

Logan District, on the head of Whitman Creek, 3 miles S. 20° W. of Holden. Authority, U. S. Coal & Oil Co. Elevation, 1070′ L.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Sand and gravel	27	7	27	7		
Sandstone, Lower Winifrede	50	8	78	3		
Shale. dark	0	3	78	6		
Coal, Chilton "A"	0	3	78	9		
Shale	0	3	79	0		
Sandstone, shaly, Upper Chilton	15	0	94	0		
Coal, soft......0′ 7″ Fire clay.......5 9 Coal ....0 2 } Chilton, upper bench.	6	6	100	6	100′	6″
Fire clay	2	0	102	6		
Sandstone	19	6	122	0		
Shale, dark	1	0	123	0		
Coal, soft.......0′. 4″ Fire clay.......0 11 Coal, hard......2 4 } Chilton, lower bench.	3	7	126	7	26′	1″
Fire clay	1	6	128	1		
Sandstone, shaly, Lower Chilton	3	11	132	0		
Shale, sandy	4	5	136	5		
Coal, Little Chilton	0	8	137	1	10′	6″
Sandstone	2	0	139	1		
Shale, sandy	1	11	141	0		
Sandstone, Hernshaw	54	0	195	0		
Shale, sandy	18	0	213	0		
Sandstone, shaly, Naugatuck	9	0	222	0		
Shale, sandy	6	0	228	0		
Sandstone, shaly	1	0	229	0		
Shale, sandy	7	5	236	5		
Coal, Dingess	0	6	236	11	99′	10″
Shale, sandy	1	1	238	0		

	Thickness Ft.	In.	Total Ft.	In.		
Sandstone, Williamson	30	9	268	9		
Coal ....0' 3"						
Shale ....0 2 } Williamson	2	1	270	10	33'	11"
Coal 1 8						
Shale, sandy	19	2	290	0		
Sandstone, Upper Cedar Grove	34	6	324	6		
Shale, sandy	28	6	353	0		
Shale, dark	14	4	367	4		
Coal, Cedar Grove, (695' L.)	7	8	375	0	104'	2"
Sandstone, shaly, Middle Cedar Grove	6	0	381	0		
Shale	4	9	385	9		
Coal ....3' 3" } Lower Cedar						
Shale band....0 4 } Grove	4	1	389	10	14'	10"
Coal 0 6						
Fire clay, to bottom	1	2	391	0		

The following record starts 54 feet, aneroid measurement, below 1 foot of coal which is either the Chilton or Chilton "A:"

United States Coal & Oil Co., Coal Test No. 2 (94).

Logan District, on Whitman Creek, 2.5 miles S. 5° E. of Holden. Authority, U. S. Coal & Oil Co. Elevation, 906' L.

	Thickness Ft.	In.	Total Ft.	In.		
Sandy gravel and boulders	17	6	17	6		
Sandstone, Hernshaw	29	6	47	0		
Sandstone, with coal partings, Hernshaw	10	0	57	0		
Shale, sandy	55	3	112	3		
Coal, Dingess	0	2	112	5	112'	5"
Shale	2	4	114	9		
Sandstone	4	0	118	9		
Shale, sandy	7	0	125	9		
Sandstone, Williamson	10	0	135	9		
Coal, Williamson	2	4	138	1	25'	8"
Fire clay	2	2	140	3		
Shale, sandy	7	6	147	9		
Sandstone	3	0	150	9		
Shale, sandy	3	0	153	9		
Sandstone, Upper Cedar Grove	49	0	202	9		
Shale	6	9	209	6		
Coal, Cedar Grove "Rider"	0	6	210	0		
Shale, dark	21	9	231	9		
Coal ....3' 0"						
Parting ....0 1 } Cedar Grove	8	0	239	9	101'	8"
Coal ....4 11 } (666' L.)						
Fire clay	3	0	242	9		
Sandstone, Middle Cedar Grove	5	6	248	3		
Shale, dark	6	6	254	9		
Coal ....4' 2" } Lower Cedar						
Coal, dirty....2 6 } Grove	6	8	261	5	21'	8"
Sandstone	1	0	262	5		
Shale, dark, to bottom	0	4	262	9		

United States Coal & Oil Co., Coal Test No. 1 (95).

Logan District, on Whitman Creek, between Left Fork and Ellis Camp Branch, 2 miles southeast of Holden. Authority, U. S. Coal & Oil Co. Elevation, 808' L.

		Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Sand and gravel		10	0	10	0		
Sandy shale (should contain Dingess limestone		32	0	42	0		
Coal ....0' 1"							
Black rash 0 10	Williamson	3	11	45	11	45'	11"
Coal 3 0							
Gray rash		1	0	46	11		
Sandstone ....21' 3"							
Sandstone, shaly 44 0	Upper Cedar Grove	65	2	112	1		
Coal, Cedar Grove "Rider"		0	3	112	4		
Shale, dark		13	6	125	10		
Coal, Cedar Grove, (676' L.)		6	7	132	5	86'	6"
Fire clay, fossilliferous		1	8	134	1		
Sandstone, Lower Cedar Grove		26	7	160	8		
Shale		0	1	160	9		
Coal ....2' 9"	Alma	3	8	164	5		
Coal, dirty 0 11							
Fire clay, hard, to bottom		1	8	166	1		

The following record starts 94 feet under what seems to be the blossom of the Chilton Coal, at the forks of the branch one-third mile east of the boring:

United States Coal & Oil Co., Coal Test No. 4 (96).

Logan District, on Left Fork of Whitman Creek, 3 miles southeast of Holden. Authority, U. S. Coal & Oil Co. Elevation, 891' L.

		Thickness Ft.	Thickness In.	Total Ft.	Total In.
Soil		2	1	2	1
Sand and gravel		10	0	12	1
Sandstone, Hernshaw		16	5	28	6
Shale, soft		21	7	50	1
Shale, sandy		49	0	99	1
Sandstone, shaly, Williamson		14	0	113	1
Shale, black, Dingess Limestone		1	0	114	1
Coal ....2' 0"					
Shale band 0 3					
Coal 1 2	Williamson	7	3	121	4
Shale, black 0 2					
Coal 3 8					
Sandstone, shaly		9	4	130	8
Sandstone, Upper Cedar Grove		22	0	152	8
Shale, sandy		19	0	171	8
Shale, dark		16	9	188	5
Coal, Cedar Grove (696' L.)		6	7	195	0

	Thickness		Total	
	Ft.	In.	Ft.	In.
Shale	5	6	200	6
Sandstone, with shale partings, Middle Cedar Grove................	10	0	210	6
Sandstone	8	0	218	6
Coal, Lower Cedar Grove...........	2	0	220	6
Shale, to bottom....................	2	0	222	6

Four tests have been made on Pine Creek and one on Cow Creek by Wood, Cole and Crane, the records of which were furnished the Survey by W. C. McCall of the W. G. Wilkins Co., of Logan, W. Va. One of these records (No. 3 of the series, No. 100 on Map II) was used in the section for Pine Creek in Chapter VI. None of these borings reached the Campbell Creek Coal. The remaining four of these records are given on the following pages:

Wood, Cole and Crane Coal Test No. 4 (98).

Logan District, on Pine Creek, 2.0 miles N. 25° W. of Oilville. Authority, Wood, Cole and Crane. Elevation, 925' B.

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Surface	7	0	7	0		
Shale	5	0	12	0		
Coal, Dingess.......................	0	4	12	4	12'	4"
Fire clay, sandy....................	2	0	14	4		
Shale, sandy........................	6	6	20	10		
Sandstone	2	0	22	10		
Sand shale..........................	5	6	28	4		
Sandstone, Williamson...............	21	8	50	0		
Coal ....2' 8" Fire clay.......1 6 Slate and coal..0 3 } Williamson (871' B.).....	4	5	54	5	42'	1"
Shale	3	0	57	5		
Shale, sandy........................	3	3	60	8		
Slate	10	9	71	5		
Sandstone ....20' 0" Sandstone, with pebbles ....1 8 } Upper Cedar Grove	21	8	93	1		
Shale	11	8	104	9		
Coal, Cedar Grove "Rider"...........	0	9	105	6		
Slate	14	8	120	2		
Coal ....2' 6" Slate ....0 2 Coal ....4 1 } Cedar Grove.	6	9	126	11	72'	6"
Fire clay and slate, to bottom......	0	8	127	7		

The following boring starts 15 feet under a coal blossom, 1 foot thick, that seems to be the Hernshaw:

Wood, Cole and Crane Coal Test No. 1 (99).

Logan Distrct, at the forks of Pine Creek, 2.3 miles N. 45° W. of Oilville. Authority, Wood, Cole and Crane. Elevation, 980′ L.

	Thickness Ft.	Thickness In.	Total Ft.	Total In.		
Surface	5	0	5	0		
Sandstone, dark	14	0	19	0		
Slate	8	2	27	2		
Shale, sandy	8	3	35	5		
Sandstone	2	6	37	11		
Shale	2	1	40	0		
Sandstone and shale 13′ 0″ Sandstone 5 6 Sandstone and shale 4 1 Williamson	22	7	62	7		
Limestone, Dingess	2	0	64	7	64′	7″
Shale and sandstone	11	0	75	7		
Shale	14	4	89	11		
Sandstone	1	2	91	1		
Coal 0′ 3″ Fire clay 1 9 Coal 0 3 Fire clay 2 4 Sandstone and shale 3 0 Slate 1 10 Coal 2 7 Williamson (851′ L.)	18	0	109	1	44′	6″
Fire clay	1	6	110	7		
Shale	10	0	120	7		
Sandstone, Upper Cedar Grove	39	0	159	7		
Sandstone and shale	8	0	167	7		
Shale	5	0	172	7		
Sandstone, dark	0	10	173	5		
Coal, Cedar Grove "Rider"	0	6	173	11		
Shale, dark	20	6	194	5		
Coal 1′ 11″ Shale and coal 0 6 Coal 0 11 Clay binder 0 0⅜ Coal 3 9⅝ Cedar Grove (778′ L.)	7	2	201	7	92′	6″
Fire clay	3	7	205	2		
Sandstone, Middle Cedar Grove	4	0	209	2		
Shale	0	9	209	11		
Coal 1′ 5″ Fire clay 0 4 Bone and coal 0 2 Lower Cedar Grove	1	11	211	10	10′	3″
Fire clay, sandy	0	8	212	6		
Shale	11	4	223	10		
Shale, sandy	2	0	225	10		
Shale, dark	3	0	228	10		
Shale, sandy	1	0	229	10		
Shale, black	1	2	231	0		
Shale	1	3	232	3		
Shale, black, with coal seams	8	6	240	9		
Fire clay, sandy	1	0	241	9		

	Thickness Ft.	In.	Total Ft.	In.		
Sandstone and shale	1	7	243	4		
Coal, Alma, (715′ L.)	1	11	245	3	33′	5″
Fire clay	0	2	245	5		
Sandstone, ...17′ 6″ Sandstone, dark .....54 8 } Peerless	72	2	317	7		
Slate	3	0	320	7		
Shale, sandy	1	9	322	4		
Sandstone and shale	6	2	328	6		
Shale, sandy	7	0	335	6		
Slate	3	7	339	1		
Coal ....0′ 2″ Fire clay and slate ....1 2 Coal ....0 8 } Campbell Creek "Rider"	2	0	341	1	95′	10″
Fire clay	0	1	341	2		
Shale	1	5	342	7		
Sandstone	5	6	348	1		
Sandstone, light gray, to bottom	9	1	357	2	16′	1″

This record lacks only a few feet of reaching the Campbell Creek (No. 2 Gas) Coal horizon.

Wood, Cole and Crane Coal Test No. 2 (101).

Logan District, on Left Fork of Pine Creek, 3.3 miles N. 85°W. of Oilville. Authority, Wood, Cole and Crane. Elevation, 1137′ B.

	Thickness Ft.	In.	Total Ft.	In.		
Surface	8	0	8	0		
Sandstone	5	0	13	0		
Sandstone and shale	5	4	18	4		
Sandstone	6	4	24	8		
Coal ....0′ 9″ Bone coal ......0 1 Coal ....2 6 } Chilton "A"	3	4	28	0	28′	0″
Fire clay, sandy	2	0	30	0		
Sand shale	1	0	31	0		
Sandstone, Upper Chilton	32	0	63	0		
Shale, broken	10	0	73	0		
Sand shale	2	2	75	2		
Shale	1	1	76	3		
Limestone, broken	0	3	76	6		
Coal, cannel ...0′ 5″ Coal.......... ..0 11 } Chilton	1	4	77	10	49′	10″
Fire clay, sandy	1	2	79	0		
Shale	16	0	95	0		
Sand shale	7	5	102	5		
Shale	1	6	103	11		
Coal	0	10	104	9	26′	11″
Fire clay	0	8	105	5		
Shale	6	2	111	7		

	Thickness		Total			
	Ft.	In.	Ft.	In.		
Shale, sandy	8	0	119	7		
Sandstone, Lower Chilton	2	5	122	0		
Shale	1	0	123	0		
Slate and coal ..0′ 6″ Coal ....1 8 Little Chilton.	2	2	125	2	20′	5″
Shale	2	0	127	2		
Sand shale	5	0	132	2		
Sandstone, Hernshaw	24	0	156	2		
Coal ....0′ 7″ Shale ....0 0½ Coal ....1 0 Hernshaw ...	1	7½	157	9½	32′	7½″
Fire clay, dark	1	0	158	9½		
Sandstone	2	0	160	9½		
Sand shale	9	2½	170	0		
Sand shale	86	0	256	0		
Sandstone, Williamson	24	0	280	0		
Coal ....1′ 6″ Fire clay ....0 1½ Coal ....0 0½ Fire clay ....0 2 Coal ....0 9 Williamson...	2	7	282	7	124′	9½″
Fire clay	1	0	283	7		
Sandy fire clay	0	6	284	1		
Shale	5	0	289	1		
Sandstone ....43′ 0″ Sandstone ..... 3 6 Upper Cedar Grove .	46	6	335	7		
Coal, local	0	9	336	4		
Shale, dark	4	8	341	0		
Shale, sandy	9	0	350	0		
Shale	13	4	363	4		
Coal ....1′ 8″ Fire clay ....0 9½ Bone coal ....1 2 Cedar Grove "Rider"	3	7½	366	11½	83′	4½″
Sand shale	3	0	369	11½		
Sandstone	0	5	370	4½		
Fire clay and slate	3	2	373	6½		
Bone coal ....0′ 1″ Shale, dark ..1 1 Bone coal ....1 5 Sand shale ...4 6½ Bone coal ....0 2 Fire clay, dark .....0 4 Fire clay, light ....1 8 Slate, dark ...0 5 Coal ....0 6 Fire clay ....0 2½ Coal ....2 10 Fire clay ....0 10 Coal ....3 1½ Cedar Grove (746′ B.).....	17	2½	390	9	29′	9½″
Fire clay, hard, sandy	0	3	391	0		
Shale, sandy	1	8	392	8		
Sandstone, Lower Cedar Grove	39	8	432	4		
Shale	0	9	433	1		

		Thickness Ft.	In.	Total Ft.	In.		
Shale and coal..0' 2"	Alma	4	6	437	7	42'	10"
Shale 0 4							
Fire clay and coal ...0 7							
Shale 0 4							
Fire clay 1 3							
Coal 1 8							
Bone coal and shale.......0 2							
Fire clay, sandy		0	8	438	3		
Slate, sandy		0	6	438	9		
Shale		1	3	440	0		
Slate, sandy		11	4	451	4		
Sandstone. Logan		9	4	460	8		
Coal, Little Alma....................		2	5	463	1	25'	6"
Fire clay, sandy......................		1	8	464	9		
Shale, sandy		4	10	469	7		
Shale, to bottom		2	1	471	8	8'	7"

The following record failed to reach down to the Cedar Grove Coal by about 50 feet, and so is of no value for a test, as it pierced no important coal horizon:

Wood, Cole and Crane Coal Test No. 5 (102).

Logan District, on Cow Creek, 2.0 miles S. 75° W. of Oilville. Authority, Wood, Cole and Crane. Elevation, 1210' B.

		Thickness Ft.	In.	Total Ft.	In.		
Surface		5	0	5	0		
Sandstone, broken		1	0	6	0		
Sandstone		31	0	37	0		
Shale, sandy		3	4	40	4		
Sandstone, Hernshaw		36	6	76	10		
Coal ....1 1"	**Hernshaw** (1128' B).....	5	6	82	4	82'	4"
Fire clay 1 3							
Coal 0 2							
Fire clay 1 0							
Coal 2 0							
Fire clay		0	6	82	10		
Shale, sandy		2	0	84	10		
Sandstone, Naugatuck		23	0	107	10		
Coal ....0' 6"	**Dingess**	1	5	109	3	26'	11"
Fire clay 0 2							
Coal 0 9							
Fire clay, dark.......................		0	3	109	6		
Fire clay, sandy......................		2	2	111	8		
Shale. sandy		2	0	113	8		
Sandstone, Williamson		10	3	123	11		
Sand and shale, to bottom		55	0	178	11	69'	8"

Detailed Records in Triadelphia District.

No borings of any kind, either for coal or for oil and gas, have been made in Triadelphia. In most of the district, the Campbell Creek and coals above it are above drainage along the principal streams, but nothing is known about the coals of the New River and Pocahontas Series.

RECORDS OF COAL TEST BORINGS IN MINGO COUNTY.

Summarized Records.

In Mingo County, 7 diamond drill tests for coal have been made. The following table gives, in summarized form, a list of these tests, with such information as is available concerning them. The explanations that precede the table of summarized records for Logan County in the first part of this Chapter apply to the table published here for Mingo:

Summarized Record of Tests

No. on Map II.	Name of Property.	Magisterial District.	Company.	Elevation A. T.
153	M. H. Waldron No. 2........	Hardee	Vinson & Thompson....	620B
154	M. H. Waldron No. 1........	Hardee	Vinson & Thompson....	620B
155	M. H. Waldron No. 3.....	Hardee	Vinson & Thompson....	....
156	United Thacker Coal Co. No. 1	Lee	United Thacker Coal...	835B
157	United Thacker Coal Co. No 3	Lee	United Thacker Coal...	1035L
158	United Thacker Coal Co. No. 4	Lee	United Thacker Coal...	1085B
159	United Thacker Coal Co. No. 2	Lee	United Thacker Coal...	1250B

Detailed Records in Harvey District.

In Harvey District, no diamond drill tests for coal have been made. The Campbell Creek Coal, which is of minable thickness both to the northeast and southwest of the district, is everywhere below drainage. The record of the Guyandot Land Association gas well (Map No. 103) published under the

Dingess Section in Chapter IV does not show any Campbell Creek Coal, but such meager evidence is by no means conclusive, so that tests for the Campbell Creek Coal might well be made with profit in Harvey District.

Detailed Records in Warfield District.

No diamond drill tests have been made in Warfield District, but numerous gas wells have been drilled in the vicinity of Kermit that offer some evidence regarding the underground coals. Most of these well records are published in Chapter VII and may be consulted there.

Detailed Records in Hardee District.

In Hardee District, three diamond drill tests have been made. The log of one of these, the M. H. Waldron No. 1 (Map No. 154) was used in the geologic section for Naugatuck in Chapter IV and may be consulted there. M. H. Waldron No. 2 (No. 153 on Map II) was made only a few feet from No. 1 and would probably show the same coals. Its record was not secured.

for Coal in Mingo County.

Coalburg Coal		Chilton Coal		Cedar Grove Coal		Alma Coal		Campbell Creek Coal			
Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Depth Top.	Thickness, Feet.	Total Depth.	No. on Map II.
......	......	......	......	......	......	......	......	......	......	......	153
......	......	......	......	64	1.0	81	12.3	170	5.3	201	154
......	......	......	......	......	......	94	10.2	196	5.9	300	155
......	......	......	......	......	......	......	......	......	......	......	156
......	......	......	......	......	......	......	......	......	......	......	157
......	......	......	......	......	......	......	......	......	......	......	158
......	......	......	......	......	......	......	......	......	......	......	159

The record of the following test made for Vinson and Thompson, together with the one published in the Naugatuck Section, was furnished the Survey by the Morrow Prospecting Co., of Wellston, Ohio, through S. W. Perry, Superintendent of the J. R. Shanklin Coal Co., of Blocton, W. Va. The record shows a considerable thickness of Campbell Creek Coal. The test was drilled on a sloping hillside along Pigeon Creek, and as the exact location could not be found, the surface elevation may be in error by 5 to 10 feet:

M. H. Waldron Coal Test No. 3 (155).

Hardee District, on Pigeon Creek, at Blocton. Authority, Vinson and Thompson. Elevation, about 625′ B.

	Ft.	In.		Thickness Ft.	Thickness In.	Total Ft.	Total In.
Surface				7	0	7	0
Fine sandrock and slate, Williamson				13	0	20	0
Slate				1	0	21	0
Coal, Williamson				0	9	21	9
Fire clay				1	3	23	0
Sandy slate and shale				25	0	48	0
Sandy slate				36	6	84	6
Shale				9	0	93	6
Slate				0	6	94	0
Coal	1′	0″	Alma (521′B)	10	2	104	2
Fire clay	1	6					
Coal	0	2					
Slate	3	0					
Coal	0	6					
Fire clay	3	6					
Coal	0	6					
Fire clay				0	6	104	8
Slate				5	6	110	2
White sandrock, Logan				54	6	164	8
Dark sandrock	10′	0″	Peerless	31	3	195	11
White sandrock	21	3					
Coal	2′	0″	Campbell Creek (No. 2 Gas) (424′ B)	4	11	200	10
Parting	0	9					
Coal	2	2					
Slate				21	6	222	4
Coal	3′	4″	Powellton (393′B)	9	4	231	8
Slate	5	0					
Coal	1	0					
Fire clay and slate				3	0	234	8
White sandrock, Matewan				28	0	262	8
Sandy slate				29	0	291	8
Dark sandrock				4	0	295	8
Sandy slate				3	2	298	10
Sandrock, to bottom				1	3	300	1

Detailed Records in Lee District.

In Lee District, four tests for coal were made by the United Thacker Coal Company on Rockhouse Fork of Pigeon Creek. As explained along with the section for Ragland in Chapter IV, these records were refused the Survey by representatives of the company on the ground that they were unreliable. The Campbell Creek Coal is under drainage in a large part of Lee District, but its presence in good thickness along Tug Fork would justify the drilling of several tests elsewhere in the district.

Detailed Records in Williamson, Magnolia and Stafford Districts.

In Williamson, Magnolia and Stafford Districts, the principal coals of the Kanawha Series are above drainage and so no core tests have been made. These districts are in a region where it is possible that coals of minable thickness in the New River and Pocahontas Series may be present.

As published in the Chattaroy Section in Chapter IV, the Buffalo Land Company No. 1 gas well (Map No. 160) shows a coal 5 feet thick that may be present in the region southeastward. Tests should preferably be made first in Magnolia District nearest to the outcrop of the New River and Pocahontas Coals in McDowell County, and extended westward if good coal is found.

MINABLE COALS OF THE ALLEGHENY SERIES.

NO. 5 BLOCK—LOWER KITTANNING COAL.

The No. 5 Block Coal, the outcrop of which is shown on Map II, is so high in the hills that prospects in it are scattered and hard to find. At some points good exposures were observed, indicating a considerable amount of minable coal. Figure 5 shows its probable minable extent.

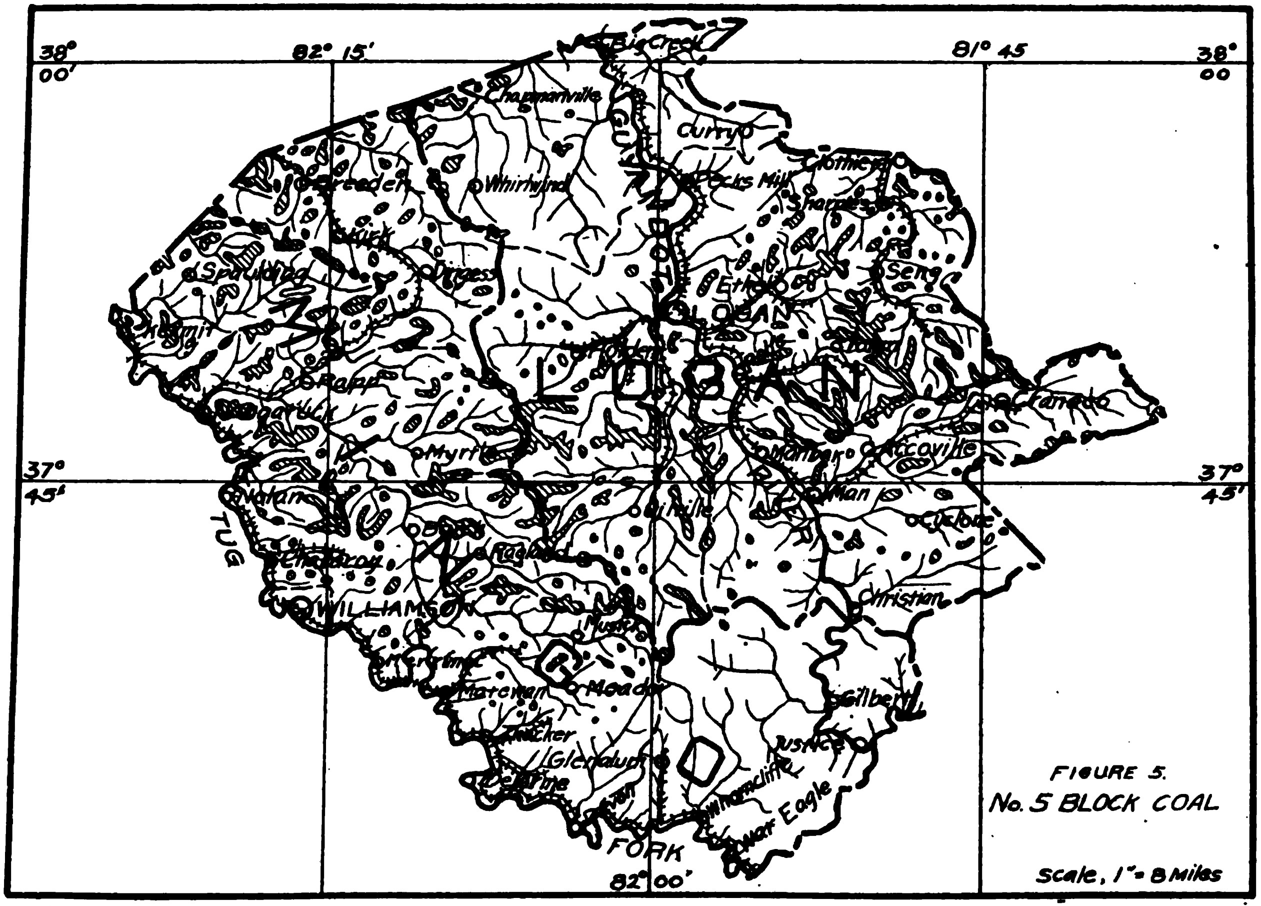

Figure 5. Showing Approximate Minable Area of No. 5 Block Coal. (See explanation in Authors' Preface.)

Chapmanville District, Logan County.

In Chapmanville District, only a few acres of the No. 5 Block Coal remain uneroded, these being situated in the western end of the district near the corner of Logan, Mingo and Lincoln Counties, as shown by its outcrop at the base of the Allegheny Series on Map II. In this region it lies just under the massive, pebbly East Lynn Sandstone, which forms a valuable guide for locating its crop.

No openings of the coal were observed within the boundaries of the district, but a prospect on the Lewis Maynard farm, located in Harts Creek District, Lincoln County, 0.1 mile north of the common corner of Logan, Mingo and Lincoln Counties, shows its character for this region. The section of this opening is used in the geologic section for the corner of Logan, Mingo and Lincoln Counties in Chapter IV. As there observed by Reger, the coal is 5′ 4″ thick, with one shale parting near the top, and appears to be good coal.

Logan District, Logan County.

The No. 5 Block Coal in Logan District is found in many of the high ridges along the Coalburg Syncline, all the way from Clothier to the Mingo County Line. Its outcrop in detail may be studied on Map II. In much of this region, owing to the presence of more accessible coals, the No. 5 Block has not been prospected. In Chapter IV its horizon is noted by Hennen in the section for Clothier, where its thickness is concealed, and by I. C. White in that for Ethel, where it is 10 feet thick, with partings. In the section for Oilville it is reported by Hennen 8′ 7″, the upper portion of which is too slaty to be good, but 3′ 6″ of splint coal being noted at the bottom.

On Spruce Fork of Coal River, the Boone County Coal Corporation has made a number of prospects in the No. 5 Block Coal, and the following five sections were furnished the Survey by this Company. The prospects are not shown on Map II, the numbers given being those of the Coal Company:

Boone County Coal Corporation, Prospect Opening G—10.

At the head of Seng Camp Branch, about 3 miles N. 80° E. of Seng; **No. 5 Block Coal.**

			Feet	Inches
Coal	1'	3"		
Slate	0	4		
Coal	0	2		
Coal, dirty	1	2		
Coal	0	2		
Slate	0	3		
Coal	1	6	4	10

Boone County Coal Corporation, Prospect Opening G—11.

Located on Seng Camp Branch about 2.3 miles N. 80° E. of Seng, shows 5′ 9″ of clean coal.

Boone County Coal Corporation, Prospect Opening G—12.

On Pigeonroost Branch, about 2 miles east of Seng; **No. 5 Block Coal.**

			Feet	Inches
Coal	3'	2"		
Slate	0	4		
Coal	2	6		
Rock	3	4		
Coal	2	0		
Bone	0	2		
Coal	2	8	14	2

Boone Co. Coal Corporation, Prospect Opening G—13, shows 5′ 9″ of clean coal and **G—20** shows 4′ 10″.

As neither the tidal elevation nor the interval above the Coalburg Coal is given in any instance, it is not certain that these prospects are in the No. 5 Block Coal. They may represent the Stockton.

The following prospect, examined by Hennen, shows the coal in good development.

Prospect Opening—No. 154 on Map II.

On Adkins Fork of Spruce Fork of Coal River, 1 mile southwest of Sovereign; No. 5 Block Coal.

			Feet	Inches
Slate, bluish gray				
Coal, gas	0'	10"		
Coal, slate gray	0	1"		
Coal	0	6½		
Slate, gray	0	2		
Coal, hard	1	11		
Bony splint	0	3		
Coal	0	10		
Bony splint	0	2		
Coal, gas, hard	0	8		
Slate, gray	0	0½		
Coal, splint	2	5	7	11

Slate, pavement, tidal elevation, 1760' B.

Another prospect, examined by Hennen, on the waters of Guyandot River, shows the following:

Prospect Opening—No. 155 on Map II.

On the head of Rum Creek, 2 miles southeast of Slagle.

			Feet	Inches
Sandstone, massive, gray, mottled slightly with iron spots				
Coal, gas, blocky	0'	9 "		
Coal, splinty	0	10		
Coal, gas, hard	0	8		
Coal, splint	0	11½	3	2½

Slate, gray, pavement, and concealed.
Tidal elevation, 1990' B.

Another prospect, **No. 156 on Map II,** located on Right-hand Fork of Rum Creek, 2 miles N. 75° E. of Manbar, having a tidal elevation of 2045 feet B., was visited by Gawthrop, but, as it had fallen shut, a section could not be made. The coal was reported by B. F. Justice as being 13 feet thick.

Triadelphia District, Logan County.

In Triadelphia District, the No. 5 Block Coal is high in the hill tops, and little attempt has been made to prospect it, owing to the presence of more convenient coals in the hills below it. No prospects were observed in the district.

Harvey District, Mingo County.

In Harvey District, the No. 5 Block Coal occurs in only a few of the highest hills, but openings indicate a considerable thickness of good coal. In the section for Hale in Chapter IV, Dr. White shows a blossom of coal 2 feet thick that represents it. Several other outcrops whose thickness could not be measured were observed by Reger, and were used in placing its crop on Map II.

The following section shows the coal in good thickness:

Jack Williams Farm Mine—No. 2 on Map II.

At the head of Jims Branch of Kiah Creek, 1.5 miles southwest of the corner of Logan, Mingo and Lincoln Counties; No. 5 Block Coal.

				Feet	Inches
1.	Sandstone, massive, pebbly, East Lynn ..				
2.	Coal, soft	0'	7"		
3.	Coal, bony	0	2		
4.	Coal, soft	1	7½		
5.	Slate, black	0	1½		
6.	Coal, medium hard	2	0	4	6
7.	Fire clay, elevation 1245' B.				

A sample for analysis was collected from Nos. 2, 4 and 6 of section and its composition is given under Mine No. 2 in the table at the end of this Chapter.

The following section of the coal was measured by Gawthrop in the same region:

Charles Hager Farm Mine—No. 157 on Map II.

At the head of Mare Branch of East Fork of Twelvepole Creek, 0.9 mile southwest of the corner of Logan, Mingo and Lincoln Counties; No. 5 Block Coal.

			Feet	Inches
Sandstone, massive, East Lynn, visible			15	0
Shale, gray			1	3
Coal, soft	0'	7"		
Shale, gray	0	4		
Coal, slaty	0	4		
Coal, semi-splint	1	1		
Shale, gray	0	2		
Coal, splint	2	1	4	7
Concealed				

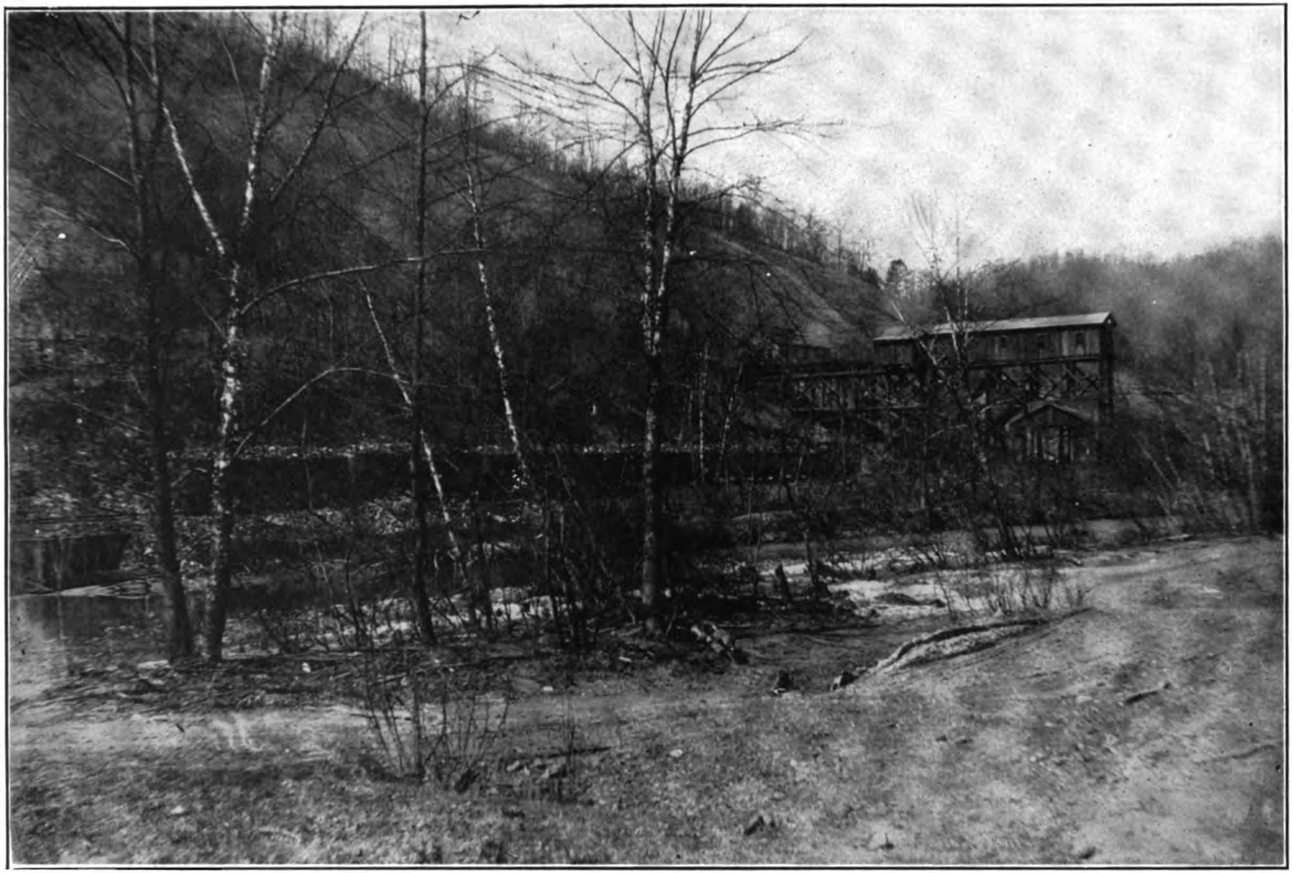

PLATE VIII.—Showing tipple of Coal Valley Mining Company and topography of Kanawha Series on Spruce Fork, Logan County.

Warfield District, Mingo County.

In Warfield District, the No. 5 Block Coal is present in only some of the high hill tops and ridges, as shown by its outcrop on Map II. So far as known, it has been prospected but little, so that reliable information as to its thickness and character is not available. The presence of the Coalburg, Chilton and Campbell Creek (No. 2 Gas) Coals lower in the hills has prevented its exploitation. The only place where it was observed, according to Reger, was at the following prospect:

Prospect Opening—No. 158 on Map II.

On Marrowbone Creek, 0.5 mile southwest of the mouth of Neely Branch, near the trail leading across to Big Road Branch of Pigeon Creek; Middle Kittanning and No. 5 Block Coals; elevation, 1220′ B.

			Feet	Inches
Sandstone				
Shale			2	0
Coal	1′	1″		
Slate, black	0	1		
Coal	1	9	2	11
Shale, sandstone, and shale			18	0
Coal	1′	0″		
Shale, gray	0	1		
Coal	1	5	2	6

The presence of a split 18 feet thick indicates that the upper portion probably represents the Middle Kittanning, and the lower one the Lower Kittanning Coal.

Hardee District, Mingo County.

As shown by Map II, the No. 5 Block Coal in Hardee District crops in some of the high hill tops and ridges. Owing to the presence of more accessible coals, it has been prospected but little. In the section for Naugatuck in Chapter IV, it is reported by M. H. Waldron to be 5 feet thick with 1 inch of slate near the middle. As the prospect had fallen shut, this measurement could not be verified. In the section for Myrtle in Chapter IV, its blossom, 1 foot thick, was observed by Reger, but the entire thickness could not be secured.

Lee District, Mingo County.

In Lee District, the No. 5 Block Coal crops high in the hill tops, as shown by Map II. No prospects were observed in it except in the section for Sprigg in Chapter IV, where Hennen reports 5 feet of coal and fire clay at the No. 5 horizon.

Williamson, Magnolia and Stafford Districts, Mingo County.

In **Williamson District**, the No. 5 Block Coal horizon is shown on Map II only in the extreme northeast corner, where a few acres of it are present. No prospects were observed.

In **Magnolia District**, as shown by Map II, the coal horizon is present in some of the high hills, but no prospects were observed.

In **Stafford District**, it is represented by four isolated hill tops near Calico, as shown by Map II, but so far as known has not been prospected. In the remainder of the district, the rise of the rocks has elevated its horizon above the hill tops.

Quantity of No. 5 Block Coal Available.

As shown by Figure 5, the No. 5 Block Coal occurs only in scattered deposits and is always so high in the hills that it can not be easily mined and for that reason has not been thoroughly prospected. The following table shows the probable amount of No. 5 Block Coal in the two counties. The acreage was determined with planimeter from Map II by Gawthrop, and the thickness for each district is based on evidence from the preceding pages:

Probable Amount of No. 5 Block Coal.

Counties by Districts.	Thickness of Coal Assumed Feet	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	4	0.90	576	100,362,240	4,014,489
Logan	5	21.38	13,683	2,980,157 400	119,206,296
Triadelphia	4	3.60	2,304	401,448,960	16,057,958
Totals		25.88	16,563	3,481,968,600	139,278,743
Mingo:					
Harvey	4	4.55	2 912	507,386,880	20,295,475
Warfield	4	3.58	2,291	399,183,840	15,967,353
Hardee	4	9.00	5,760	1,003,622,400	40,144,896
Lee	4	5.45	3,488	607,749,120	24 309,965
Williamson	4	0.01	6	1,045,440	41,817
Magnolia	4	1.32	845	147,232,800	5,889,312
Stafford	4	0.15	96	16,727,040	669,082
Totals		24.06	15,398	2,682,947,520	107,317,900
Totals for both Counties		49.94	31,961	6,164,916,120	246,596,643

MINABLE COALS OF THE KANAWHA SERIES.

THE STOCKTON COAL.

The Stockton Coal, briefly described in Chapter VI, page 137, like the No. 5 Block, is high in the hills all over the two counties, and for that reason prospects are few. The indications are that it is irregular in its distribution and more prospecting will be necessary to determine definitely the localities where it is good. Figure 6 shows its probable minable areas.

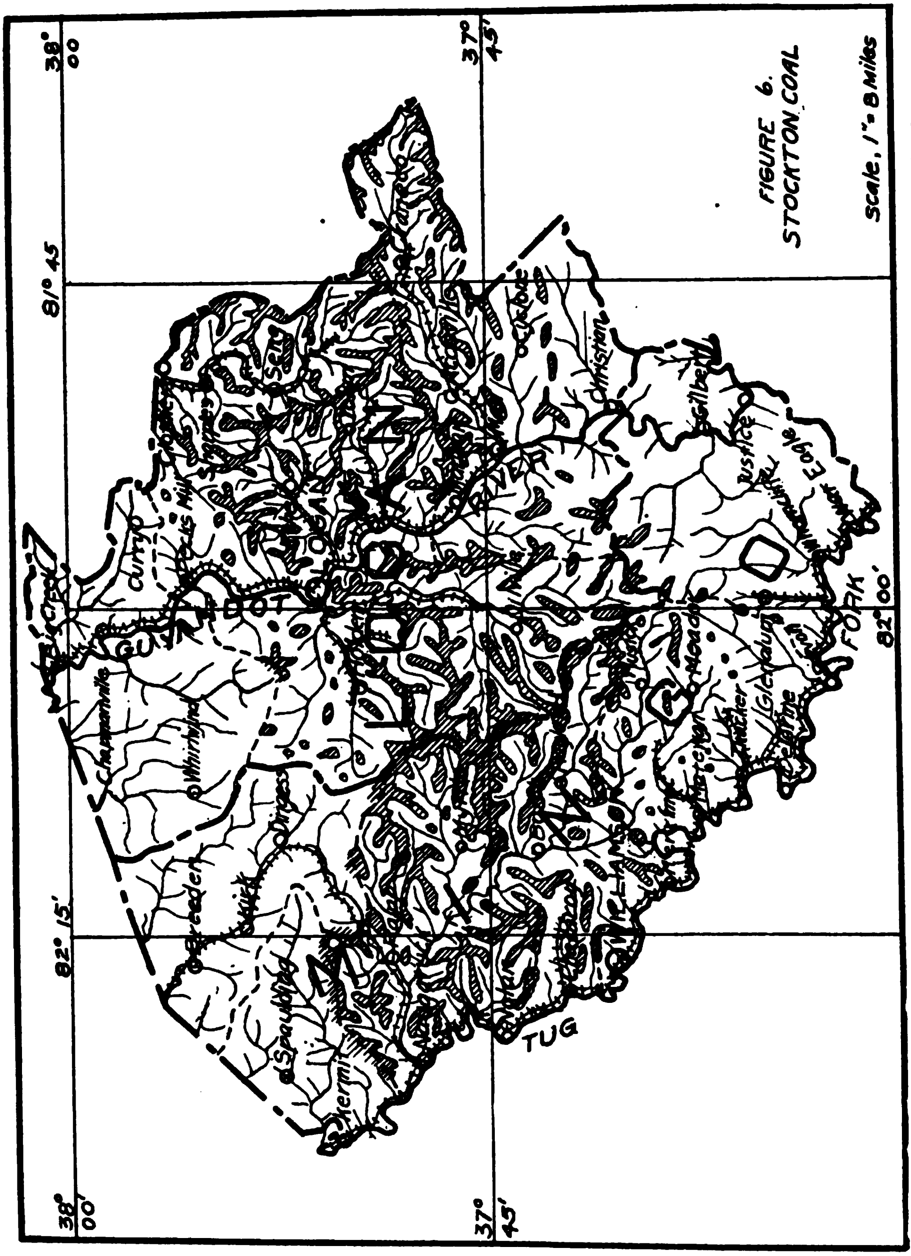

Figure 6. Showing Approximate Minable Area of Stockton Coal. (See explanation in Authors' Preface.)

Chapmanville District, Logan County.

In Chapmanville District, the Stockton Coal horizon occurs in a strip 3 to 4 miles wide next to the Lincoln County Line, and is then absent along the Warfield Anticline, but is present again in some of the high knobs southeast of the anticline. Its crop is not shown on Map II, but its position is about midway between the No. 5 Block and Coalburg Coals, of which the outcrops are shown, so that its probable extent may be determined with fair accuracy.

No prospects were observed in the district. In the section for the corner of Logan, Mingo and Lincoln Counties in Chapter IV, its blossom is noted just outside the county line in Harts Creek District, Lincoln County. Owing to the fact that no prospects could be found, it is doubtful whether this coal is of commercial thickness in Chapmanville District.

Logan District, Logan County.

In Logan District, the Stockton Coal is present in the high ridges along the Coalburg Syncline. Its crop at any point may be determined from Map II by interpolation between the No. 5 Block and the Coalburg.

In the section for Ethel in Chapter IV, it is noted by Dr. White as being 4 feet thick and splinty. In the section for Oilville in the same Chapter, it is reported by Hennen as being 10′ 6″ thick at Prospect **No. 159 on Map II,** at an elevation of 1845 feet, aneroid measurement. In the section for Stollings in Chapter VI, it is reported 6′ 0″ thick by Hennen.

In the Coal River region, it is noted in the Boone County Coal Corporation Coal Test No. 6 (No. 57 on Map II), southeast of Sovereign, as being 7 feet thick. In the same region, it is noted in the Boone County Coal Corporation Coal Test No. 3 (No. 59 on Map II) as being 1′ 6″ thick.

On the head of Seng Camp Creek, 2.7 miles N. 70° E. of Seng, a coal is reported at an elevation of 1690′ B. by Gawthrop at prospect **No. 160 on Map II** that seems to be the Stockton, but the hole was washed nearly full of dirt and only 1′ 6″ of coal was visible.

On Righthand Fork of Rum Creek, 2 miles northeast of Manbar, the Stockton Coal is reported by Gawthrop at **Prospect No. 161 on Map II** at an elevation of 1835 feet B. The hole had fallen shut, but according to B. F. Justice, a resident, there was 7′ 10″ of clean coal.

It is not probable that the Stockton Coal is present in good thickness all along its outcrop, as it could not be found at several points near Logan and Holden, where a careful search was made.

Triadelphia District, Logan County.

In Triadelphia District, the horizon of the Stockton Coal occurs in many of the high ridges in the northern and central portions, but in the extreme southern end, next to Wyoming County, it belongs above the hill tops. In the central part, the outcrops are scattered so that it is only in the northern part that any considerable body of the coal may be found. There is no certainty that it is of commercial thickness here, as no prospects were observed. In Wyoming County, near the Triadelphia line, Hennen observed the following opening:

Oliver Lusk Farm Mine—No. 162 on Map II.

Wyoming County, 0.2 mile southeast of the corner of Boone, Logan and Wyoming Counties; Stockton Coal. Elevation, 2660′ B.

			Feet	Inches
Slate				
Coal, slaty	0′	9″		
Slaty, black	1″ to 0	2		
Coal, gas	2	0		
Coal, interlaminated with black slate	1	6		
Coal, gas	2	0	6	5
Slate				

Harvey District, Mingo County.

In Harvey District, the horizon of the Stockton Coal belongs well up towards the tops of the hills, as may be observed by interpolation between the No. 5 Block and the Coalburg on Map II. It is not probable that the coal is of minable thickness in the district as no prospects could be found. This coal was observed at the head of Jims Branch of Kiah Creek, along the Lincoln County Line, 1.4 miles southeast of the corner of Logan, Mingo and Lincoln, where Reger reports its blossom at an elevation of 1160 feet B., 85 feet below an opening in the No. 5 Block Coal previously described. It was also observed by Reger at the head of Breeden Creek along the hill road leading to Swelled Hickory Gap where its blossom comes at an elevation of 1380 feet B.

Warfield District, Mingo County.

In Warfield District, the Stockton Coal horizon is well up toward the hill tops. The lack of prospects in it leads to the belief that it is not of commercial thickness over any large area. Its horizon was observed by Reger along the Warfield-Hardee District Line on the ridge between Little Laurel Branch of Marrowbone and Big Branch of Pigeon Creek, where its blossom occurs at an elevation of 1235 feet B., 90 feet above an opening in the Coalburg Coal.

Hardee District, Mingo County.

In Hardee District, the Stockton Coal horizon occupies a considerable acreage in the ridges along the Coalburg Syncline. In the section for Naugatuck in Chapter IV, its blossom is noted by Reger, but only a streak was found here. A prospect opened in Hardee District in what appears to be the Stockton Coal is reported by Reger, as follows:

Mount and Ooten Prospect Opening—No. 163 on Map II.

On a branch of Pigeon Creek, 2 miles N. 70° W. of Myrtle; Stockton Coal. Elevation 1325′ B.

			Feet	Inches
Sandstone, massive, Homewood				
Shale, gray				
Coal, soft	1′	5″		
Slate, cannel	0	1		
Coal, soft	0	11		
Slate, black, soft	0	4		
Coal, slaty	1	10		
Slate	0	3		
Coal, hard	0	8	5	6
Concealed by water and mud				

Another prospect in the same district, according to Reger, shows the following:

Prospect Opening—No. 164 on Map II.

On Riffe Branch of Pigeon Creek, 0.6 mile northwest of Myrtle; **Stockton Coal.** Elevation, 1370′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			3	0
Coal, soft	2′	7″		
Slate, black, soft	0	4	2	11
Coal, thickness concealed by dirt				

Lee District, Mingo County

In Lee District, the Stockton Coal occurs high up in the ridges so that it has not been generally prospected. In Chapter IV, its blossom is reported in the sections for Ragland and Chattaroy and at Rawl it is reported by Hennen as being over 7 feet thick. In Chapter VI, its blossom is reported in the section for Hatfield P. O.

The following measurement was made by Gawthrop at an opening in this district:

Geo. White Farm Mine—No. 165 on Map II.

On the head of Hell Creek, 2.2 miles S. 85° W. of Burch; **Stockton Coal.** Elevation, 1530′ B.

			Feet	Inches
Sandstone, massive				
Coal, slaty	0′	6″		
Slate, black	0	1		
Coal, hard	2	2		
Slate, black	0	1		
Shale, gray	0	11		
Coal, visible	1	0	4	9

Another opening farther east is reported by Reger as follows:

United Thacker Coal Co. Prospect—No. 3 on Map II.

On the head of Rockhouse Fork of Pigeon Creek, 2.0 miles north of Musick; Stockton Coal. Elevation, 1900′ B.

				Feet	Inches
1.	Sandstone, massive				
2.	Coal, soft	3′	11½″		
3.	Shale, gray	0	1⅛		
4.	Coal, soft	4	1		
5.	Slate, black, soft	0	6		
6.	Coal, semi-splint	2	6		
7.	Shale, gray	0	3		
8.	Coal, splint	1	10	13	3
9.	Shale, gray				

A sample was collected from Nos. 4, 6 and 8 of section, the composition of which is reported under Mine No. 3 in the table of analyses at the end of this Chapter.

Williamson District, Mingo County.

In Williamson District, the Stockton Coal crops only in a narrow strip along the high boundary ridge at the north and northeast. In Chapter IV, it is reported in the Williamson Section by White and Hennen as being 5′ 4″ thick.

Magnolia District, Mingo County.

In Magnolia District, the Stockton Coal crops only in some of the high ridges in the northern and central parts of the district. In the southeastern part, it belongs above the hill tops. The following section was observed by Gawthrop:

Prospect Opening—No. 166 on Map II.

On Nighway Branch of Pigeon Creek, 1.1 miles northeast of Calico; Stockton Coal. Elevation, 2015′ B.

			Feet	Inches
Shale				
Slate, coaly			1	10
Coal, gas	1′	10″		
Coal, slaty	0	4		
Shale, gray	0	6		
Coal, gas	3	10		
Shale	0	2		
Coal	5	6	12	2
Shale				

"Coal is so badly weathered cannot tell character of it."

Stafford District, Mingo County.

In Stafford District, the Stockton Coal crops only in the high ridges at the northwest corner at the heads of Horsepen and Bens Creeks. In the remainder of the district, it belongs above the hill tops. No prospects were observed.

Quantity of Stockton Coal Available.

As shown by Figure 5, the Stockton Coal occupies scattered areas through the two counties. It is always so high in the hills that it has not been prospected thoroughly. The following estimate, based on the evidence furnished in the preceding pages and on an interpolation of the area by Gawthrop from Map II, is perhaps approximately correct:

Probable Amount of Stockton Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	..	......	......	....	....
Logan	4	55.00	35,200	6,133,248,000	245,329,920
Triadelphia	4	14.00	8,960	1,561,190,400	62,447 616
Totals		69.00	44,160	7,694,438 400	307,777,536
Mingo:					
Harvey	..	......	......	....	....
Warfield	..	......	......	....	....
Hardee	4	19.00	12,160	2,118,758,400	84,750,336
Lee	5	13.00	8,320	1,812,096,000	72,483 840
Williamson	5	0.15	96	20,908,800	836,352
Magnolia	5	4.00	2,560	557,568,000	22,302,720
Stafford	5	0.50	320	69,696 000	2,787,840
Totals		36.65	23,456	4,579,027,200	183,161,088
Totals for both Counties		105.65	67,616	12,273,465,600	490,938,624

THE COALBURG COAL.

The Coalburg Coal, briefly described in Chapter VI, pages 138-140, is the highest seam in the hills that has been extensively prospected. It is of wide occurrence throughout the two counties and is a valuable commercial deposit. Map II shows its outcrop and Figure 7 shows the areas where it is believed to be of minable thickness and quality.

Chapmanville District, Logan County.

In Chapmanville District, the Coalburg Coal horizon, as shown by its outcrop on Map II, belongs high in the hills. Along the Lincoln County Line, where the strata are dipping rapidly northwestward, there is a considerable acreage of it, but along the crest of the Warfield Anticline it touches only the highest hill tops. Absolute information is not available to show whether the coal is of minable thickness in the district. No prospects were found in it and a thorough search in the wooded hill tops where it should occur failed to reveal its presence. This failure to find signs of the coal leads to the belief that extensive deposits of it are lacking in the district.

Numerous openings in the Coalburg Coal were visited just across the Lincoln County Line in Harts Creek District. In the section for the Logan, Mingo and Lincoln Counties Corner in Chapter IV, it is reported 2 feet thick by Lewis Maynard, who prospected it in Harts Creek District near the county line. An opening visited by Reger on the Guyandot River shows the coal in typical form for this region, as follows:

Frank Davis (McKinsey Coal Co.) Farm Mine—No. 167 on Map II.

On Guyandot River, 0.6 mile southeast of Ferrellsburg; Coalburg Coal. Elevation, 898′ B.

	Feet	Inches
Sandstone, massive		
Coal, soft	**0′**	**9″**
Slate, black, soft	**0**	**4**
Coal, semi-splint	**1**	**3½**
Slate, black	**0**	**0½**

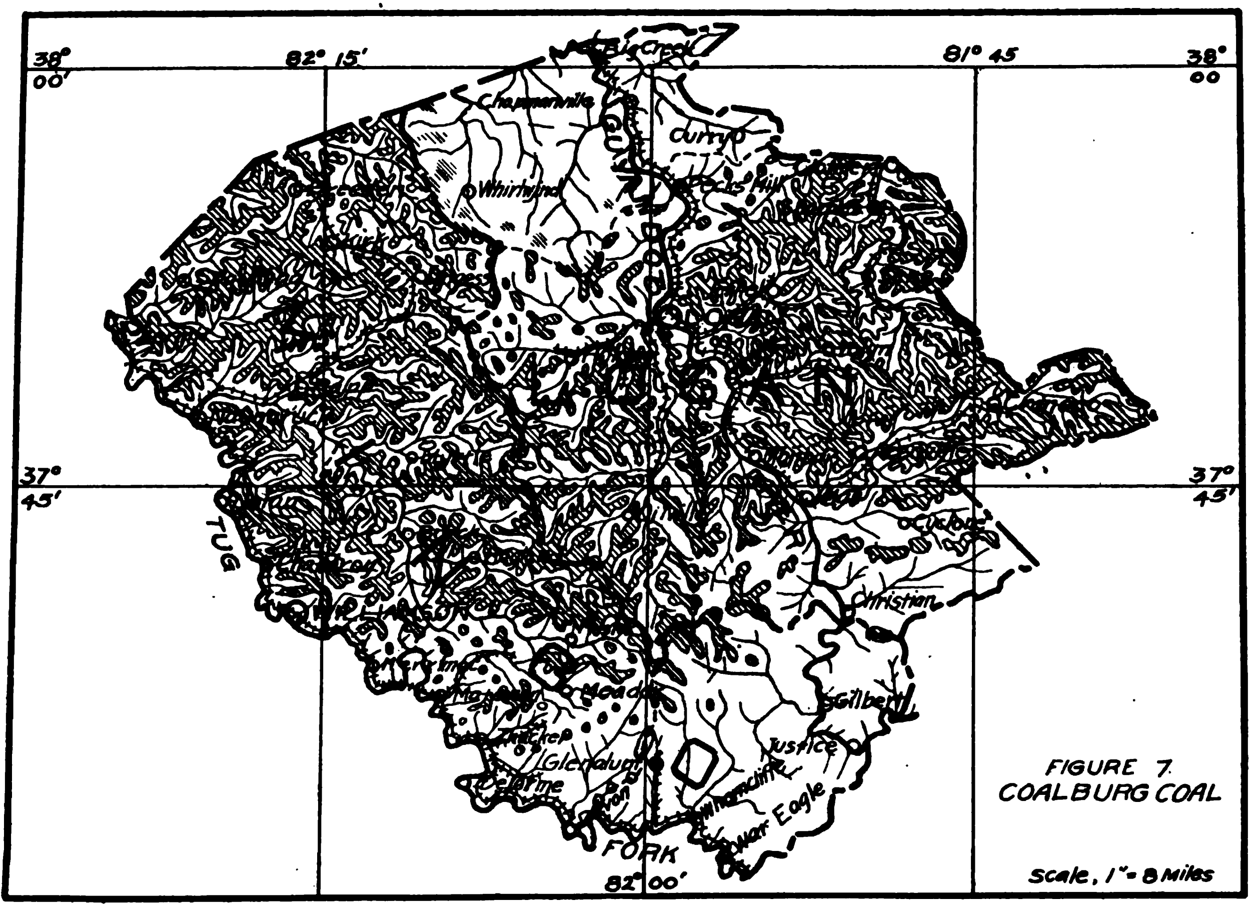

Figure 7. Showing Approximate Minable Area of Coalburg Coal. (See explanation in Authors' Preface).

			Feet	Inches
Coal	0′	5″		
Shale, dark	2	5		
Coal, splint	1	9	7	0
Fire clay, and sandstone, massive, Lower Coalburg			90	0

This opening was classified in the Report of the Survey for Cabell, Wayne and Lincoln Counties, on pages 202-4, under the name of the McKinsey Coal Company, as the No. 5 Block Coal, being shown as Opening No. 140 on the Economic Geology Map for Lincoln County. The correlation is changed in the present report on the strength of a hand leveled section measured by Reger just north of Ferrellsburg and distant less than one mile from this opening, as follows:

Ferrellsburg Section, Harts Creek District, Lincoln County.

				Thickness Feet.	Total Feet.
Sandstone, massive, pebbly, in upper portion, East Lynn				84	84
Concealed				31	115
Coal blossom, No. 5 Block (1043′ L.)				..	115
Interval, massive sandstone at base				192.7	307.7
Slate, dark (0′ 2″)				0.2	307.9
Coal, medium hard	0′	9″	(5′ 1″) Coalburg (845′ L.)	5.1	312
Slate, dark	0	8			
Coal	1	8			
Shale, gray, visible	2	0			
(Bottom member once mined but now concealed by debris.)					
Concealed and sandstone, massive				79.6	391.6
Coal, medium hard	2′	6″	(3′ 5″) Winifrede (762′ L.)	3.4	395
Bone	0	2			
Coal	0	9			
Concealed to C. & O. R. R. grade at Ferrellsburg (625′ L.)				337	732

The coal shown here as the Coalburg is the same as at the Frank Davis mine, since the upper part of it has almost the same section and the lower bench was once mined, but was concealed when visited, and since it comes just over the great Lower Coalburg Sandstone which makes a cliff easily followed by eye along the hillside, and since the elevation of the coal at Ferrellsburg is only 53 feet lower than at the Davis mine, which is accounted for by the northwestward dip of the measures. Furthermore, this stratigraphic group; viz, the great massive, pebbly East Lynn Sandstone with the No. 5 Block Coal sometimes underlying it, and the Coalburg Coal, with a type section that it preserves with few variations, coming about 200 feet under the pebbly cliff, was carried by Reger all along the Lincoln-Logan, Lincoln-Mingo, and Wayne-Mingo Boundary Lines to Kermit, Mingo County, on Tug Fork of the Big Sandy River, and thence southeastward across the Warfield Anticline to Naugatuck in the Coalburg Syncline, being checked at numerous points by measurements up from the unmistakable fossiliferous Dingess Limestone, which underlies the Coalburg Coal 350 to 400 feet. From Naugatuck, the Coalburg Coal was carried by Reger along the Coalburg Syncline eastward to the Mingo-Logan Line and thence northeastward to the Guyandot River at Logan. From the Guyandot River it was carried northeastward along the syncline by Hennen to the Boone County Line in the Clothier region, where its horizon has not been subject to doubt.

The detailed sections secured during this work are published in Chapters IV and VI and many of the sections of the Coalburg Coal will be given in the present Chapter. The Coalburg Coal could not be carried directly up the Guyandot River from Ferrellsburg to Logan, owing to the lack of openings across the axis of the Warfield Anticline, which in this vicinity has elevated the rocks to a much higher level than on Tug Fork and prospects could not be found in the high coals.

The following section of the Coalburg Coal was measured by Reger some distance west of the Logan-Lincoln Line:

James Dalton Prospect—No. 168 on Map II.

On Big Branch of Hart Creek, 2.7 miles southwest of Hart; Coalburg Coal.. Elevation, 890′ B.

			Feet	Inches
Sandstone, massive				
Coal, soft	2′	5″		
Slate, black, soft	0	7		
Coal	0	8		
Slate, black	0	1		
Coal	0	6		
Slate, dark, bony	3	3		
Coal, splinty	2	11	10	5
Fire clay				

The coal here has the same partings as at Ferrellsburg. Its interval from the top of the pebbly cliff is 300 feet. This opening was classified as the Stockton-Lewiston Coal in the Cabell-Wayne-Lincoln Report, but its type section and interval from the pebbly East Lynn Sandstone indicate that it is the Coalburg.

Another opening in Harts Creek District, Lincoln County, near the Logan Line, is reported by Gawthrop, as follows:

John Thompson Farm Mine—No. 169 on Map II.

On a branch of Hart Creek, 2.8 miles southwest of Hart; Coalburg Coal. Elevation, 960′ B.

			Feet	Inches
Sandstone, massive, broken, visible			8	0
Shale, gray			1	0
Coal, soft	0′	2″		
Slate, black	0	2		
Coal, soft	0	11		
Coal, hard	1	6	2	9
Concealed				

Here the lower bench of the coal is concealed or absent. This opening is 190 feet B. below an opening in the No. 5 Block Coal 0.4 mile northwestward on the same branch that was examined by Reger and found to be 5′ 2″ thick.

Logan District, Logan County

In Logan District, the Coalburg Coal horizon, as shown by its outcrop on Map II, is present in the high ridges along the Coalburg Syncline. Sufficient evidence was secured to warrant the statement that it is generally present, with local exceptions, in minable thickness where its outcrop occurs. Its commercial value is much reduced by several slate partings, the largest of which is from 1 to 2 feet thick, coming 2 to 3 feet above the bottom and separating the fine splint coal of the lower bench from the remainder of the seam. Careful mining methods are necessary in order to handle the coal successfully.

In Chapter IV, the coal is noted in the section for Clothier, where it is 6′ 3″ thick and contains several slate partings.

In Chapter VI it is reported in the sections for Beech Creek, Holden and Laurel Fork of Pine Creek, where its detailed appearance is shown..

In the present Chapter, it is described from the Boone County Coal Corporation Coal Test No. 7 (No. 52A on Map II), Boone County Coal Corporation No. 6 (No. 57 on Map II), and Boone County Coal Corporation No. 3 (No. 59 on Map II), the details of which are given on preceding pages.

In the Coal River region, the following section was measured by Hennen:

Prospect Opening—No. 170 on Map II.

On Beech Creek, 2.3 miles southwest of Sharples; Coalburg Coal. Elevation, 1200′ B.

			Feet	Inches
Sandstone, shaly			2	0
Shale, bluish gray			1	0
Coal, semi-splint	1′	6″		
Slate, gray	0	1½		
Coal, bony, cannel	1	2		
Coal, splint and bony	2	3		
Slate, dark, with laminated coal streaks	1	8		
Coal, good	1	5	8	1½
Fire clay and sandy shale				

The following prospect is reported by Hennen:

Prospect Opening—No. 6 on Map II.

On Adkins Fork, 1.5 miles south of Seng; Coalburg Coal. Elevation 1460′ B.

			Feet	Inches
1. Shale, roof				
2. Coal, slaty	0′	6″		
3. Coal, slaty	3	11	4	5
4. Slate, dark gray				

A sample for analysis was collected from No. 3 of section, the composition of which is reported under Mine No. 6 in the table at the end of this Chapter.

The following prospect in the same vicinity was examined by Hennen:

Prospect Opening—No. 171 on Map II.

On Spruce Fork, 0.3 mile south of Seng; **Coalburg Coal.** Elevation, 1435′ B.

			Feet	Inches
Shale			4	0
Coal, gas	0′	6″		
Coal, splint	0	9		
Coal	2	2		
Slate, gray, hard	0	4		
Coal, hard	0	6	4	3
Slate pavement				

The following prospect is reported by Gawthrop:

Boone County Coal Corporation Prospect—No. 4 on Map II.

On Beech Creek near the mouth of Left Fork, 1 mile southwest of Sharples; **Coalburg Coal.** Elevation, 1210′ B.

			Feet	Inches
1. Shale, sandy				
2. Coal, slaty	0′	5″		
3. Slate	0	1		
4. Coal, slaty	1	8		
5. Coal, gas	0	10		
6. Coal, harder	0	3		
7. Shale, coaly	2	0		
8. Coal, hard	1	0	6	3
9. Concealed				

Sample collected for analysis from Nos. 5, 6, and 8 of section, for the composition of which, see Mine No. 4 in the table at the end of this Chapter.

The following is reported from the same region by Gawthrop:

Prospect Opening—No. 172 on Map II.

On a branch of Beech Creek, 0.7 mile southwest of Sharples; **Coalburg Coal.** Elevation, 1197′ B.

			Feet	Inches
Shale			2	0
Coal	0′	5″		
Slate	0	0½		
Coal, hard	1	11		
Bone	0	1½		
Coal	0	2		
Shale	0	11		
Coal, splint	0	5	4	0
Slate				

The following prospect is reported by Gawthrop, several miles eastward from the last opening:

Paris Jarrold Heirs Prospect—No. 5 on Map II.

On Seng Camp Creek, 3.2 miles southeast of Sharples; **Coalburg Coal**; elevation, 1470′ B.

				Feet	Inches
1.	Sandstone, visible			3	0
2.	Coal, hard, splinty	1′	9″		
3.	Shale	0	7		
4.	Coal	2	0		
5.	Bone	0	5		
6.	Shale	0	1		
7.	Coal, hard	0	9	5	7
8.	Slate				

Sample collected for analysis from Nos. 2, 4 and 7 of section, at face, 20 feet from mouth of opening.

The composition of the sample is given under Mine No. 5 in the table at the end of this Chapter.

An opening measured by Gawthrop on another branch of the same creek is as follows:

Paris Jarrold Heirs Prospect—No. 173 on Map II.

On Seng Camp Creek, 3.4 miles southwest of Sharples; **Coalburg Coal**; elevation, 1505′ B.

			Feet	Inches
Shale				
Coal, gas	1′	5″		
Shale, gray	0	2½		
Coal	0	1½		
Shale, gray	0	7		
Coal and shale in streaks	0	6		
Coal, soft	0	7		
Coal, harder	2	1	5	6
Slate				

The following opening, examined by Reger, was made by Samuel Gilman near his residence, in southwestern Logan District:

Wood, Cole & Crane Prospect—No. 7 on Map II.

On the head of Pine Creek, near Laurel Fork, 5.6 miles southwest of Holden; Coalburg Coal; elevation, 1380′ B.

				Feet	Inches
1.	Concealed, with coal blossom				
2.	Coal, soft	1′	0″		
3.	Slate, black, with streaks of coal	0	6		
4.	Coal, soft	0	8½		
5.	Slate, gray	0	0½		
6.	Coal, soft	1	6		
7.	Coal, splint	3	7	7	4
8.	Shale, gray				

A sample for analysis was collected from No. 7 of section, the composition of which is given under Mine No. 7 in the table at the end of this Chapter. The analysis shows a fine quality of high volatile coal.

The following section was measured by Reger, near the Logan-Mingo Line:

Thomas Curry Farm Mine—No. 8 on Map II.

On the head of Cow Creek, 3 miles northeast of Varney; Coalburg Coal; elevation, 1705′ B.

				Feet	Inches
1.	Sandstone, massive				
2.	Shale, sandy			4	0
3.	Coal, soft	0′	8″		
4.	Slate, black, with streaks of coal	0	9		
5.	Coal, soft	1	7½		
6.	Slate, gray	0	0½		
7.	Coal, semi-splint	2	10	5	11
8.	Sandstone				

A sample was collected for analysis from Nos. 5 and 7 of section, the composition of which is given under Mine No. 8 in the table at the end of this Chapter. The coal was somewhat dirty owing to the lack of cover, making a high percentage of ash.

The following section was measured by Gawthrop in the same vicinity:

Victor Curry Farm Mine—No. 174 on Map II.

On Cow Creek, 2.2 miles southwest of Oilville; **Coalburg Coal**; elevation, 1690′ B.

			Feet	Inches
Sandstone, massive, Upper Coalburg, visible			15	0
Shale, gray			1	0
Slate, coaly			1	3
Coal, soft	0′	7″		
Coal, harder	0	5		
Shale, gray	0	1		
Coal, medium hard	0	4		
Shale, gray	0	1		
Coal, splint	0	7		
Bone	0	1		
Coal, splint	1	1		
Slate	0	1		
Coal, splint	2	0		
Shale	0	6		
Coal, slaty	2	6		
Shale	0	6		
Coal, hard, visible	1	6	10	4
Concealed, by water				

Triadelphia District, Logan County.

In Triadelphia District, as shown by Map II, the Coalburg Coal horizon is high in the hills. The presence of good coal lower in the hills has prevented the Coalburg from being searched for. No prospects were observed in the district so that its quality and thickness are still a matter of doubt.

Harvey District, Mingo County.

In Harvey District, the Coalburg Coal has been prospected sufficiently to show that it is generally present where its outcrop occurs as shown on Map II.

In Chapter IV it is noted in good thickness in the sections for Breeden and Hale and in Chapter VI it is reported in the section for Cub Branch of East Fork of Twelvepole Creek.

In the northern end of Harvey District, the big slate becomes 15 to 20 feet thick, so that often only one bench of the coal is open at the prospects. This is true at the corner of Logan, Mingo and Lincoln Counties, where the coal is reported by Lewis Maynard as being only 2 feet thick in the section for that place given in Chapter IV.

The following section, measured by Reger, shows only the lower bench:

Guyandot Land Association Prospect—No. 175 on Map II.

On the head of Kiah Creek, 0.2 mile southwest of the corner of Logan, Mingo and Lincoln Counties; Coalburg Coal; elevation, 1000' B.

	Feet	Inches
Shale, sandy	7	0
Concealed, and shale, gray	5	0
Coal, splinty	1	6
Fire clay		

Here the upper bench of the coal does not show, but the prospect comes just 200 feet, aneroid measurement, below an opening in the No. 5 Block Coal that is just below the great pebbly East Lynn Sandstone.

One mile and a half southwest of this prospect, Reger examined another that shows the same condition of the coal, as follows:

R. F. Hager Prospect—No. 176 on Map II.

On the head of Alex Branch of East Fork of Twelvepole Creek, 1.8 miles southwest of the county corner; Coalburg Coal; elevation, 1040' B.

	Feet	Inches
Sandstone, massive		
Shale, gray	4	0
Coal, visible	2	0
Concealed		

Here the coal comes 205 feet, hand level measurement, below the blossom of the No. 5 Block Coal, which shows along the trail to the north just under the pebbly sandstone, and which is mined just across the hill at the Jack Williams opening, previously reported.

The split in the Coalburg Coal is shown by the following prospect, examined by Reger, in the edge of Lincoln County:

Marion Vance Prospect—No. 177 on Map II.

On Laurel Branch of East Fork of Twelvepole Creek, 3.2 miles west of the corner of Logan, Mingo and Lincoln Counties; **Coalburg Coal.**

	Thickness Ft.	Thickness In.	Total Ft.	Total In.
Sandstone, massive, pebbly, with shale partings, East Lynn	95	0	95	0
Coal blossom, No. 5 Block	...	.	95	0
Concealed	150	0	245	0
Coal blossom, Stockton	...	.	245	0
Concealed and sandstone, massive	93	2	338	2
Shale, gray	0	6	338	8
Coal, soft.......1' 6" Slate, dark gray.0. 10 Coal ....0 5 } **Coalburg, Upper Bench**	2	9	341	5
Shale, dark	2	0	343	5
Shale, gray	20	0	363	5
Coal, splint, Coalburg, Lower Bench (885' B.)	1	7	365	0

The short section is given above to show the relationship between the Coalburg Coal and the pebbly sandstone. The interval from the top of the Coalburg Coal to the base of the cliff is 243′ 8″, from which about 25 feet should be subtracted for the westward dip of the measures along the hillside, making the interval between the Coalburg and No. 5 Block nearly the same as at Alex Branch of Twelvepole.

The following exposure was measured by Gawthrop:

S. F. Wiley Prospect—No. 178 on Map II.

On the head of Trace Branch of East Fork of Twelvepole Creek, 1.5 miles north of McCloud; **Coalburg Coal**; elevation, 1136′ B.

			Feet	Inches
Shale, visible			10	0
Coal	0′	4″		
Slate, black	0	2		
Coal, medium hard	1	2		
Slate, black	0	5		
Coal, splint	1	2	3	3
Concealed by water				

The following exposure was examined by Reger in the same vicinity:

Jefferson Adkins Farm Mine—No. 9 on Map II.

At the mouth of Trace Branch of East Fork of Twelvepole Creek, 1.3 miles northwest of McCloud; **Coalburg Coal**; elevation, 1140′ B.

				Feet	Inches
1.	Sandstone, massive, Upper Coalburg			55	0
2.	Concealed			10	0
3.	Shale, brown			15	0
4.	Coal, medium hard	1′	9″		
5.	Slate, black	0	3		
6.	Coal, splint	2	9	4	9
7.	Fire clay				

A sample for analysis was collected from Nos. 4 and 6 of section, the composition of which is given under Mine No. 9 in the table at the end of this Chapter. Owing to the fact that the coal was muddy, the analysis shows a high percentage of ash.

The following was observed by Reger near the Mingo-Lincoln Line:

Jackson Vance Prospect—No. 179 on Map II.

On Cub Branch of East Fork of Twelvepole Creek, 1.2 miles northeast of Breeden; **Coalburg Coal**; elevation, 1115′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			1	6
Coal	0′	9″		
Slate, black	0	8		
Coal, semi-splint	1	3		
Slate, dark	1	1		
Coal, splint	1	6	5	3
Fire clay				

Here all evidence of the split that separates the two benches of the coal near the corner of the three counties has disappeared and its typical section is apparent. The pebbly East Lynn Sandstone is present in the ridge above the coal.

On Hickory Branch of West Fork of Twelvepole, 1.5 miles northwest of Breeden, the Coalburg Coal was once prospected on the land of the Red Jacket Coal Co. at **Prospect No. 180 on Map II**, at an elevation of 1110′ B. The prospect had fallen shut when visited by Reger, but the coal was reported 4 feet thick by Richard D. Kirk, a resident.

An opening examined by Reger near the corner of Wayne, Lincoln and Mingo Counties shows the following:

Kelly Vance Farm Mine—No. 181 on Map II.

On West Fork of Twelvepole Creek, near Bull Branch, 1.7 miles northwest of Breeden; Coalburg Coal; elevation, 1110′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			0	6
Sandstone, shaly			1	0
Shale, gray			1	6
Coal, slaty	1′	4″		
Slate, black, soft	0	4		
Coal, semi-splint	0	10		
Slate, dark, with coal streaks	1	0		
Coal, splint	1	6	5	0
Fire clay				

Another opening visited by Reger shows the following:

Wm. Kirk Farm Mine—No. 182 on Map II.

On West Fork of Twelvepole Creek, 1.2 miles northwest of Breeden; Coalburg Coal; elevation, 1125′ B.

			Feet	Inches
Sandstone, massive				
Slate, dark, hard			1	6
Slate, dark, soft			0	6
Coal	0′	8″		
Slate, dark	0	1		
Coal	1	2		
Slate, dark	0	10		
Coal	1	6	4	3
Fire clay				

At the **Henry Marcum Prospect No. 182A** on Map II, on West Fork of Twelvepole Creek, 0.3 mile north of Breeden, coming at an elevation of 1165′ B., no section could be made, as it had fallen shut when visited by Reger, but about 4 tons of nice clean coal were visible on the dump and the vein was reported 6 feet thick by a resident.

The following opening was examined by Reger near the line between Harvey and Warfield Districts:

Prospect Opening—No. 183 on Map II.

On the head of Breeden Creek, 2.5 miles southwest of Breeden; **Coalburg Coal**; elevation, 1165' B.

			Feet	Inches
Shale, gray				
Coal, gas	1'	6"		
Slate, dark	0	5		
Coal, semi-splint	1	2		
Slate, dark, with some coal	1	0		
Coal, splint	1	7	5	8
Shale, gray				

The following prospect was examined by Reger farther east:

Prospect Opening—No. 184 on Map II.

On Openmouth Branch of West Fork of Twelvepole Creek, 2 miles S. 5° E. of Breeden; **Coalburg Coal**; elevation, 1190' B.

			Feet	Inches
Sandstone, massive				
Coal, soft	1'	2"		
Slate, black	0	2		
Coal	0	9		
Slate, black	0	4		
Coal, semi-splint	1	7		
Slate, black, bony	1	3		
Coal, splint	2	5	7	8
Fire clay				

The following prospect was examined by Reger farther east up Twelvepole:

H. C. Closterman Prospect—No. 185 on Map II.

On Kiln Creek of East Fork of Twelvepole, 0.7 mile southeast of Kirk; **Coalburg Coal**; elevation, 1230' B.

			Feet	Inches
Sandstone, massive				
Shale, gray			0	6
Coal, soft	1'	4"		
Slate, black, soft	0	3		
Coal, semi-splint	1	7		
Slate, black, bony	1	3		
Coal, splint	1	8	6	1
Fire clay				

In the Dingess region, the Coalburg Coal is high in the hills along the Warfield Anticline, and, so far as known, has not been prospected, but in the section for Hale, 2 miles southward, made by Dr. White, it is present in good development and typical section as shown in Chapter IV, where the section is published.

The analysis of the coal from the **Mingo Block Coal Co. Prospect Opening (No. 10 on Map II)** from a sample secured by Hennen and published in Volume II(A), page 411, is given under Mine No. 10 in the table at the end of this Chapter. The details of the coal were published in the geologic section for Hale, as described above.

An opening in the extreme southeast corner of Harvey District, examined by Reger, shows the Coalburg Coal in fine development, as follows:

Ben. Sturgell Prospect—No. 186 on Map II.

On the head of Main Laurel Fork of Pigeon Creek, 4.3 miles southwest of Holden; Coalburg Coal; elevation, 1340′ B.

			Feet	Inches
Coal, soft	1′	0″		
Shale, gray	0	5		
Coal, harder	1	2		
Coal, soft	0	10		
Slate, black, with coal streaks	0	10		
Coal, soft	2	0		
Shale, gray	1	4		
Coal, hard, splinty	2	4	9	11
Fire clay and concealed				

Warfield District, Mingo County.

In Warfield District, the Coalburg Coal occupies a considerable acreage in the hills, as shown by Map II. Owing to the rapid southwestward dip of the axis of the Warfield Anticline, it was possible to carry the horizon of this coal entirely across this fold and thus establish its identity with the same coal along the Coalburg Syncline in the Naugatuck region. In most of the district, the coal is good, but at a few points near Kermit, it is locally absent, since the records of some of the gas wells drilled through it do not show it and surface examination showed that its horizon is sometimes occupied by a heavy sandstone.

The following prospect was observed by Reger at the Wayne-Mingo Line:

Sarah Spaulding Prospect—No. 187 on Map II.

On a short branch of Tug Fork, at the Wayne-Mingo County Line, 1.5 miles north of Kermit; Coalburg Coal; elevation, 1125' B.

			Feet	Inches
Shale, gray, with plant fossils				
Slate, black			1	4
Coal, slaty	1'	5"		
Shale, black	1	4		
Coal, gas	1	2		
Slate, black	0	2½		
Coal	0	11		
Slate, dark, soft	0	3½		
Coal	0	3		
Shale, dark, coal streaks	1	0		
Coal, splint	1	5	8	0
Fire clay				

A prospect, once made on the crest of the Warfield Anticline where it crosses Marrowbone Creek, was examined by Reger, but had fallen shut. The section of the opening was furnished from memory by Jesse Parsley, a resident, who made it, as follows:

Prospect Opening—No. 188 on Map II.

On Marrowbone Creek, 2 miles northeast of Kermit; elevation, 1290' B.

			Feet	Inches
Coal	2'	6"		
Slate	0	9		
Coal, splint	8	0		
Bone	0	4		
Coal, splint	3	0	9	7

The following prospect farther up Marrowbone Creek was examined by Reger:

Burning Creek-Marrowbone Land Co. Prospect—No. 189 on Map II.

On Bent Branch of Marrowbone Creek, 2.8 miles southeast of Spaulding; Coalburg Coal; elevation, 1065′ B.

			Feet	Inches
Shale, gray				
Coal	4′	0″		
Slate, black	0	4		
Coal, semi-splint	0	11½		
Slate, black	0	2½		
Coal	0	4		
Slate, black, bony	0	11		
Coal, splint	1	3	8	0
Fire clay				

Another opening farther up the creek, examined by Reger, shows the following:

Stewart Wood Prospect—No. 190 on Map II.

At the mouth of Messer Branch of Marrowbone Creek, 1.3 miles south of Swelled Hickory Gap; Coalburg Coal; elevation, 1065′ B.

			Feet	Inches
Sandstone, massive				
Coal, laminated with slate	0′	10″		
Coal, soft	1	1		
Slate, black	0	7		
Coal, soft	0	11		
Slate, bony	0	5		
Coal, splint	2	3	6	1

This opening is 220 feet, hand-level measurement, above an abandoned opening in the Chilton Coal.

The following opening was examined by Reger near the axis of the Warfield Anticline:

Logan Cannel Coal Co. Opening—No. 191 on Map II.

Along the hill road between Marrowbone Creek and West Fork of Twelvepole, 2 miles east of Swelled Hickory Gap; Coalburg Coal; elevation, 1170′ B.

			Feet	Inches
Sandstone, massive				
Slate, gray			0	4
Coal	0′	7″		
Slate, dark	0	1		
Coal	1	1		

			Feet	Inches
Slate, black	0′	4½″		
Coal, semi-splint	1	1½		
Slate, black, bony	1	1		
Coal, splint, thickness concealed, should be	1	5	5	9

The bottom portion was concealed by debris, but its thickness was supplied from other openings in the neighborhood. Coal from this opening was formerly used to run a hoisting engine that hauled saw logs across the divide.

The following partial section of the coal was measured by Reger in the same region:

James Bailey Heirs Prospect—No. 192 on Map II.

On Marrowbone Creek, 2 miles southeast of Swelled Hickory Gap; Coalburg Coal; elevation, 1115′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	7″		
Slate, dark	0	1		
Coal	1	6		
Slate	0	3	2	5
Coal, thickness concealed				

Here the bottom part of the seam had not been opened.

Another prospect near the head of the creek shows the following, according to Reger:

Solomon Lackey Prospect—No. 193 on Map II.

On the head of Marrowbone Creek, 2.6 miles south of Kirk; Coalburg Coal; elevation, 1185′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			0	9
Coal	0′	5″		
Slate, black	0	6		
Coal	1	2		
Slate, black	0	2		
Coal	0	7		
Slate, black	0	3		
Coal, semi-splint	1	9		
Shale, dark	1	6		
Coal, splint	1	2	7	6
Fire clay				

The Burning Creek-Marrowbone Land Company has prospected the Coalburg Coal thoroughly on Upper Burning Creek. The following is one of these prospects as examined by Reger:

Burning Creek-Marrowbone Land Co. Prospect—No. 194 on Map II.

On Upper Burning Creek, 2 miles southeast of Kermit; Coalburg Coal; elevation, 935' B.

			Feet	Inches
Sandstone, massive				
Coal, soft	2'	0"		
Slate, black	0	4		
Coal	0	4		
Slate, black, bony	1	0		
Coal, splint	1	5	5	1
Fire clay				

The following is another prospect on the same creek, as examined by Reger:

Burning Creek-Marrowbone Land Co. Prospect—No. 195 on Map II.

On Upper Burning Creek, 3 miles S. 80° E. of Kermit; Coalburg Coal; elevation, 951' B.

			Feet	Inches
Sandstone, massive				
Coal	0'	1"		
Slate, black	0	4		
Coal, laminated with slate	0	8		
Coal, soft	1	6		
Slate, gray	0	0½		
Coal, semi-splint	1	2		
Coal, bony	0	3		
Slate, dark, with coal streaks	1	5½		
Coal, splint	1	4	6	10
Fire clay and sandstone to Burning Creek-Marrowbone Land Co. Gas Well No. 3 (No. 151 on Map II)			16	0

Another prospect, as measured by Reger, shows the following:

Burning Creek-Marrowbone Land Co. Prospect—No. 196 on Map II.

On the head of Upper Burning Creek, 3.4 miles S. 80° E. of Kermit; Coalburg Coal; elevation, 950′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	10½		
Slate, black	0	0½		
Coal, gas	0	11		
Slate, black	0	3		
Coal, semi-splint	0	11		
Slate, black	0	3½		
Coal, slaty	0	4½		
Slate, black	0	11		
Coal, splint	1	5	6	0
Fire clay				

The following prospect was examined by Reger farther up Tug Fork:

Prospect Opening—No. 197 on Map II.

On Tug Fork, near Norfolk & Western Ry. tunnel, 1.6 miles southeast of Kermit; Coalburg Coal; elevation, 920′ B.

			Feet	Inches
Sandstone, massive, Upper Coalburg			45	0
Coal	0′	2″		
Slate, dark	0	4		
Coal, slaty	0	7		
Coal	1	7	2	8
Shale, gray, visible			0	10

It is doubtful whether the entire section is shown here, as the prospect had fallen partly shut.

The following exposure was examined by Reger near the Coalburg Syncline:

Prospect Opening—No. 198 on Map II.

On Parsley Big Branch of Tug Fork, 1.5 miles northwest of Blocton; Coalburg Coal; elevation, 945′ B.

			Feet	Inches
Sandstone, massive, and concealed				
Coal	2′	2″		
Slate, dark	0	4		
Coal	0	4		
Coal, slaty	1	3		
Coal, splint	1	7	5	8

The coal was weathered so much at the prospect, which was in the branch, that the section may not be entirely correct.

Hardee District, Mingo County.

In Hardee District, there is a large acreage of Coalburg Coal along the Coalburg Syncline. Numerous prospects have been made, showing that it is usually present in minable thickness, and it is being mined commercially by two companies. Besides the smaller slates in the upper bench, the coal contains the "big" slate, as usual, which causes great inconvenience in mining.

In Chapter IV, the Coalburg is noted in the sections for Naugatuck and Myrtle.

At the following mine the coal is operated extensively:

J. R. Shanklin Coal Co. Mine—No. 13 on Map II.

At Blocton; **Coalburg Coal**; elevation, 1003′ L.

				Feet	Inches
1.	Sandstone, massive, Upper Coalburg			15	0
2.	Coal, gas, medium hard ...	1′	4″		
3.	Shale, gray	0	1		
4.	Coal, gas, soft	0	4		
5.	Shale, gray	0	1		
6.	Coal, medium hard	0	11		
7.	Bone coal.................	0	4		
8.	Coal, splint	1	9		
9.	Coal, gas	0	5	5	3
10.	Shale				

"Principal office, Blocton; daily capacity. 300 tons; 30 laborers and 45 miners employed; mule and steam haulage; coal used for steam; shipped northwest; butts, N. 45° E. (pocket compass); greatest rise, S. 40° E ; sample collected for analysis from Nos. 2. 4, 6, 8 and 9 of section in room No 4 off No. 2 Left Heading by R. M. Gawthrop; C. A. Parcell, Foreman, authority for data."

The analysis of this coal is given under Mine No. 13 in the table at the end of this Chapter. The coal is prepared for market in a large washery that removes much of the dirt. Only the upper part of the seam is being mined, the shale reported in No. 10 of section being the big slate that overlies the bottom bench of splint coal.

The following opening in the same region was examined by Reger:

Marion Evans Farm Mine—No. 199 on Map II.

On Den Branch of Pigeon Creek, 2.1 miles east of Naugatuck; **Coalburg Coal**; elevation, 1075' B.

			Feet	Inches
Sandstone, massive				
Coal, bony	0'	8"		
Coal, gas	0	11		
Coal, semi-splint	0	5		
Slate, gray	0	3		
Coal	0	2½		
Slate, black, soft	0	3½		
Coal, soft	1	6		
Bone	0	2		
Coal, splint, visible, 0' 10"; reported	2	0		
Slate, black, reported	1	6		
Coal, splint, reported	1	10	9	9
Slate, pavement				

The bottom portion of the seam was concealed, but this was furnished by a resident.

Another opening in the same region shows the following, according to Reger:

Stewart Wood Prospect—No. 200 on Map II.

On Old House Branch of Tug Fork, 1 mile northeast of Maher Station; **Coalburg Coal**; elevation, 1100' B.

			Feet	Inches
Sandstone				
Concealed			5	0
Slate, black			3	0
Coal, bony	2'	0"		
Coal, soft	1	7		
Slate, gray	0	4		
Coal	0	4		
Slate, dark	0	3		
Coal, semi-splint	1	1		
Slate, black	0	1		
Coal, semi-splint	2	1	7	9
Concealed, not taken up				

The following commercial mine is operating the Coalburg Coal:

Big Block Coal Co. Mine—No. 12 on Map II.

On north side of Pigeon Creek, 0.5 mile west of Eugene; Coalburg Coal; elevation, 1019' H. L.

				Feet	Inches
1.	Sandstone, flaggy			5	0
2.	Shale, dark, silicious			5	0
3.	Bone	0'	6"		
4.	Coal, semi-splint	1	4½		
5.	Slate, black	0	2		
6.	Fire clay, gray	0	1		
7.	Coal, gas	0	2		
8.	Shale, dark	0	2		
9.	Coal, gas	0	11		
10.	Bone	0	4		
11.	Coal, semi-splint	0	8		
12.	Coal, gray splint	0	2		
13.	Coal, gas, hard	0	7	5	1½
14.	Slate				

"Coal owned by J. M Smith and M. A. Poore; principal office, Williamson, W. Va.; daily capacity, 40 tons; daily output, 30 tons; 7 laborers and miners employed; mule haulage; used for domestic fuel; shipped west; no butts or faces; greatest rise, north; sample collected from Nos. 4, 7, 9, 11, 12 and 13 of section, Room No. 1, off Straight Heading, by R. M. Gawthrop; James H. Deskins, operator, authority for data."

The section above does not include the lower bench of the coal which is not mined. The composition of the sample is given under Mine No. 12 in the table at the end of this Chapter.

A sample formerly collected and analyzed by the Survey from this mine is reported in Volume II(A), page 410, No. 2 of table, under the name of the Walnut Hill Coal & Mining Co.

The following prospect was examined by Reger farther up the same branch:

Prospect Opening—No. 201 on Map II.

On a branch of Pigeon Creek, 0.7 mile northwest of Eugene; Coalburg Coal; elevation, 1020' B.

			Feet	Inches
Sandstone, massive				
Coal, bony	0'	4"		
Coal	1	3		
Shale, gray	0	4		
Coal	0	3		
Shale, gray	0	1		
Coal	2	0	4	3
Concealed				

The following prospect, examined by Reger, is located in the same region:

Prospect Opening—No. 202 on Map II.

On Mill Branch of Pigeon Creek, 0.3 mile northwest of Eugene; **Coalburg Coal**; elevation, 1025′ B

			Feet	Inches
Sandstone, massive				
Shale, gray			3	0
Coal, bony	2′	0″		
Coal, soft	1	2		
Shale, gray	0	8		
Coal, visible	1	0	4	10
Concealed				

The following prospect was examined by Reger:

Prospect Opening—No. 203 on Map II.

On Pigeon Creek, 0.5 mile southwest of Rapp; **Coalburg Coal**; elevation, 1080′ B.

			Feet	Inches
Sandstone, shaly				
Coal	1′	2″		
Shale, gray	1	6		
Coal, soft	0	10		
Coal, semi-splint	1	4		
Slate, black, soft	0	3		
Coal, soft	1	1		
Coal, slaty	0	7		
Coal, splint	1	7	8	4
Shale and concealed			5	0
Sandstone, massive, making cliff, Lower Coalburg			60	0

The following section of the coal was measured by Reger in the same vicinity:

Prospect Opening—No. 204 on Map II.

On Right Fork of Laurel Fork of Pigeon Creek, 0.3 mile south of Rapp; **Coalburg Coal**, elevation, 1050′ B.

			Feet	Inches
Sandstone, massive				
Coal, bony	0′	6″		
Coal, soft	1	0		
Cannel slate	0	1		
Coal, semi-splint	1	1		
Slate, dark, soft	0	5		

			Feet	Inches
Coal, hard	0'	6"		
Coal, bony	0	11		
Slate, dark	0	4		
Coal, splint	1	10	6	8
Fire clay				

The following opening, examined by Reger, appears to be the Coalburg Coal, since it comes 375 feet above the fossiliferous Dingess Limestone, which crops on the same stream, and 220 feet above an old opening in the Chilton Coal:

Prospect Opening—No. 205 on Map II.

On the head of Bearpen Branch of Laurel Fork, 2.1 miles northwest of Canterbury; **Coalburg Coal**; elevation, 1140' B.

			Feet	Inches
Sandstone, massive				
Coal, semi-splint	1'	5"		
Slate, black	0	4		
Coal	0	10	2	7
Fire clay				

Another opening, examined by Reger, in what is undoubtedly the same seam, shows the following:

Prospect Opening—No. 206 on Map II.

On the head of Big Branch of Pigeon Creek, 2.5 miles northwest of Canterbury; **Coalburg Coal**; elevation, 1145' B.

			Feet	Inches
Sandstone, massive, pebbly				
Shale, gray			0	6
Coal, gas	2'	0"		
Slate, black	0	1		
Coal, semi-splint	1	9	3	10
Fire clay				

The following prospect, examined by Reger, shows a typical section of the Coalburg:

Mingo Block Coal Co. Prospect—No. 11 on Map II.

On a branch of Left Fork of Laurel Fork, 0.7 mile southeast of Canterbury; **Coalburg Coal**;, elevation, 1135' B.

			Feet	Inches
Sandstone, massive				
Slate, dark			2	0
Coal, semi-splint	1'	4"		
Slate, bony	0	1		
Coal, semi-splint	0	10		
Slate, black, soft	0	4		
Coal, semi-splint	0	8		
Coal, slaty	1	0		
Shale, gray	0	5		
Coal, splint	1	9	6	5
Fire clay				

A sample of this coal was once collected for analysis by Hennen and published in Volume II(A) of the Survey Reports, page 410, No. 9, under the name of the Thacker Coal. This analysis is republished under Mine No. 11 in the table at the end of this Chapter.

The following prospect, in the same neighborhood, shows the same structure, as examined by Reger:

Mingo Block Coal Co. Prospect—No. 207 on Map II.

On Laurel Fork of Pigeon Creek, 0.5 mile east of Canterbury; **Coalburg Coal**; elevation, 1090' B.

			Feet	Inches
Sandstone, massive				
Coal, soft	1'	5"		
Slate, bony	0	1		
Coal	0	11		
Slate, black, soft	0	5		
Coal, semi-splint	1	3		
Coal, slaty	0	9		
Coal, splint	1	7	6	5
Fire clay				

The following prospect, examined by Reger, shows much the same type of coal:

W. J. Williamson Prospect—No. 208 on Map II.

On Big Branch of Pigeon Creek, 3.3 miles southeast of Lenore; **Coalburg Coal**; elevation, 1250′ B.

			Feet	Inches
Sandstone, massive				
Coal, soft	1'	5"		
Slate, black	0	1		
Coal, soft	1	4½		
Slate, black	0	5½		
Coal	1	1		
Coal, slaty	0	10		
Coal, splint	1	3	6	6
Fire clay				

From the following opening, examined by Reger, coal was once used to run the hoisting engine on a log incline, but is now abandoned:

Coal Opening—No. 209 on Map II.

At the head of Left Fork of Riffe Branch of Trace Fork of Pigeon Creek, 1.8 miles northwest of Myrtle; **Coalburg Coal**; elevation, 1280′ B.

			Feet	Inches
Sandstone, massive, making cliff, Upper Coalburg				
Coal, soft	1'	6"		
Slate, black	0	1		
Coal, soft	1	0		
Slate, black, soft	0	4		
Coal, soft	0	9		
Coal, slaty	1	7		
Coal, splint	1	8	6	11
Fire clay				

The following exposure, as examined by Reger, shows the Coalburg Coal in the eastern end of Hardee District. The coal had not been prospected, but the thickness was secured by digging a trench across its outcrop in a ravine and measuring it with a rule and hand level. The coal was too much weathered to show the partings:

Finley Sheppard Exposure—No. 210 on Map II.

On a branch of Trace Fork of Pigeon Creek, 3.3 miles east of Myrtle; **Coalburg Coal**; elevation, 1390′ B.

	Feet	Inches
Steep bluff, mostly sandstone	170	0
Coal, Coalburg	6	6
Fire clay and concealed	10	0
Sandstone, massive, Lower Coalburg	20	0

The following opening was examined by Reger in the southern part of Hardee District:

Zaccheus Deskins Prospect—No. 211 on Map II.

At the head of Board Branch of Pigeon Creek, 2.6 miles southeast of Lenore; Coalburg Coal; elevation, 1194′ H. L.

			Feet	Inches
Sandstone, massive, Upper Coalburg			30	0
Shale			7	0
Coal	0′	3″		
Slate, gray	0	2		
Coal, soft	0	7		
Slate, black	0	1		
Coal, soft	0	4		
Coal, splint	2	0		
Bone, reported	0	6		
Coal, reported	8	0	11	11

The two lower members of the section were reported by Mr. Deskins, who once had the entire coal opened in another prospect near by, which had fallen shut.

Lee District, Mingo County.

In Lee District, the Coalburg Coal lies higher in the hills than in Hardee, but it has been worked much more extensively, several large mines being in operation in the vicinity of Chattaroy and Williamson. The section of the coal varies somewhat from that observed farther north, the "big" slate and the bottom bench of splint coal being replaced by layers of gas coal and slate. In most prospects observed, the coal was found in good thickness.

In Chapter IV, the Coalburg Coal is noted in the sections for Ragland, Chattaroy, Rawl and Sprigg. In Chapter VI, it is noted in the section for Rockhouse Fork.

The following prospect, examined by Gawthrop, shows a good section of the coal in the northeastern part of the district:

Cole & Crane Prospect—No. 212 on Map II.

On Left Fork of Elk Creek, 1.8 miles N. 85° E. of Bias; **Coalburg Coal**; elevation, 1500′ B.

			Feet	Inches
Shale and earth				
Coal	2′	0″		
Shale	2	0		
Coal	1	10		
Bone	0	1		
Coal	3	9		
Shale	0	3		
Coal	1	2		
Bone	0	2		
Coal	0	5	11	8
Concealed				

The following prospect, examined by Reger, shows a good thickness of the coal along Rockhouse Fork:

United Thacker Coal Co. Prospect—No. 213 on Map II.

On South Branch of Rockhouse Fork of Pigeon Creek, 2 miles east of Ragland; **Coalburg Coal**; elevation, 1615′ B.

			Feet	Inches
Sandstone, massive, pebbly, Upper Coalburg				
Coal, soft	2′	6″		
Slate, black	0	4		
Coal	1	6		
Slate, coaly	0	3		
Coal	1	10	6	5
Concealed				

Three commercial mines are in operation along Buffalo Creek that work the Coalburg Coal. The following is located near the Hardee-Lee District Line:

Howard Jr. Colliery Co., Howard Jr. Mine—No. 14 on Map II.

On Cain Fork of Buffalo Creek, 2 miles northeast of Chattaroy; **Coalburg Coal**; elevation, 1315′ B.

				Feet	Inches
1.	Sandstone, massive, Upper Coalburg			15	0
2.	Coal, splinty	1′	6½″		
3.	Coal, gas, hard	0	4		
4.	Slate, black	0	6		
5.	Coal, gas	0	3		
6.	Coal, splinty	0	11		
7.	Bone	0	5		
8.	Coal, gas, hard	1	1½		
9.	Shale, gray 0′ 1″ to	0	2		
10.	Coal, gas	0	6	5	9
11.	Slate				

"Coal owned by Howard Jr. Land Co.; principal office, Chattaroy; daily capacity, 100 tons; daily output, 60 tons; 3 laborers and 6 miners employed; mule haulage; used for steam and domestic fuel; shipped east; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 3, 5, 6, 8 and 10 of section, in Room No. 8 off 2nd Cross Heading, by R. M. Gawthrop; W. S. Estler, Superintendent, authority for data"

The composition of the sample is published under Mine No. 14 in the table at the end of this Chapter.

The following mine is near the mouth of Cain Fork:

Buffalo Collieries Co., Buffalo Mine—No. 15 on Map II.

On north side of Buffalo Creek, 0.8 mile northeast of Chattaroy; **Coalburg Coal**; elevation, 1315′ B.

				Feet	Inches
1.	Sandstone, massive			5	0
2.	Coal, gas, hard	1′	5½″		
3.	Shale, gray	0	0½		
4.	Coal, gas, hard	0	6		
5.	Slate	0	0¼		
6.	Coal, splinty	0	9		
7.	Bone	0	3		
8.	Coal, semi-splint	0	11		
9.	Slate	0	0¼		
10.	Coal, gas, hard	1	2	5	1½
11.	Slate				

"Coal owned by Buffalo Collieries Co.; principal office, Chattaroy; daily capacity, 150 tons; daily output, 100 tons; 5 laborers and 10 miners employed; mule haulage; used for steam; shipped west; no regular butts or faces; greatest rise S. 37° E.; sample collected from Nos. 2, 4, 6, 8, and 10 of section, in room No 2 off No. 4 East Heading, by R. M. Gawthrop; S. V. Preston, Manager, authority for data."

The composition of this sample is published under Mine No. 15 in the table of analyses at the end of this Chapter.

The following mine is farther east along a branch of the same creek:

Howard Collieries Co., Howard Mine—No. 16 on Map II.

On South Fork of Buffalo Creek, 2.2 miles east of Chattaroy; **Coalburg Coal**; elevation, 1385′ B.

				Feet	Inches
1.	Sandstone, massive			10	0
2.	Shale, gray			2′ 0″ to 4	0
3.	Coal, slaty	0′	5″		
4.	Coal, gas, hard	1	9		
5.	Shale	0′ 0½″ to 0	1		
6.	Coal, gas	0	3½		
7.	Coal, splinty	1	1		
8.	Bone	0	4		
9.	Coal, hard	0	10		

				Feet	Inches
10.	Bone	0′	1½″		
11.	Coal, gas	0	4½		
12.	Bone	0′ 0½″ to 0	3		
13.	Coal, gas	0	7	6	1½
14.	Slate				

> "Coal owned by Buffalo Land Co , of Huntington; principal office, Chattaroy; daily capacity, 175 tons; daily output, 100 tons; 5 laborers and 10 miners employed; mule haulage; used for domestic fuel; shipped west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 4, 6, 7, 9, 11 and 13 of section, in room No 9 off First Cross Entry, of No. 2 opening, by R. M. Gawthrop; W. S Estler, Superintendent, authority for data."

The composition of this sample is given under Mine No. 16 in the table at the end of this Chapter.

The following section of the Coalburg Coal was made by Gawthrop at an abandoned mine along Buffalo Creek:

Howard Colliery Co., Frederick Mine—No. 214 on Map II.

On Buffalo Creek, 0.7 mile east of Chattaroy; **Coalburg Coal**; elevation, 1295′ B.

			Feet	Inches
Sandstone				
Coal, hard	1′	6″		
Coal, splint	2	2		
Coal, softer	1	1	4	9
Shale				

The following prospect was examined by Gawthrop:

Prospect Opening—No. 215 on Map II.

On Buffalo Creek, 3.3 miles northeast of Williamson; **Coalburg Coal**; elevation, 1425′ B.

			Feet	Inches
Sandstone, massive			10	0
Shale, gray			5	0
Coal, medium hard	2′	2″		
Shale	0	0½		
Coal	1	9		
Coal, bony	0	3		
Coal, hard	1	3	5	5½
Shale				

The following prospect, examined by Gawthrop, shows the coal near the head of Buffalo Creek:

Samuel Patterson Prospect—No. 216 on Map II.

On the head of Buffalo Creek, 1.2 miles northeast of Cinderella; Coalburg Coal; elevation, 1395' B.

			Feet	Inches
Sandstone, massive				
Coal, hard	2'	8"		
Coal, bony	0	3		
Coal, hard	2	0	4	11

The following mine is located south of the last prospect along another creek:

Sycamore Coal Co., Cinderella Mine—No. 17 on Map II.

On Sycamore Creek, at Cinderella; Coalburg Coal; elevation, 1422' L.

				Feet	Inches
1.	Sandstone, massive				
2.	Shale	0'	0" to	2	0
3.	Coal, slaty	0'	2"		
4.	Coal, splinty	0	6		
5.	Coal, gas, hard	1	1		
6.	Bone	0	0½		
7.	Coal, gas	0	3		
8.	Coal, semi-splint	1	5		
9.	Bone	0	6		
10.	Coal, gas	0	8	4	7½
11.	Slate				

"Coal owned by Sycamore Coal Co.; principal office Vivian; daily capacity, 100 tons; daily output, 50 tons; 2 laborers and 8 miners employed; electric haulage; used for domestic fuel; shipped west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 4, 5, 7, 8, and 10 of section, at face of First Left Heading of No. 1 Mine, by R. M. Gawthrop; Evan Thomas, Superintendent, authority for data."

The composition of this sample is given under Mine No. 17 in the table at the end of this Chapter.

The following mine is located in the southern end of Lee District, one mile from the Kentucky State Line:

Crystal Block Coal and Coke & Co. Mine—No. 18 on Map II.

On Dick Williamson Branch of Tug Fork, 1.0 mile northeast of Rawl; Coalburg Coal; elevation, 1571' L.

				Feet	Inches
1.	Sandstone, massive			10	0
2.	Coal, semi-splint	0'	4"		
3.	Coal, gas, hard	1	0		
4.	Coal, splinty	0	4		

				Feet	Inches
5.	Coal, gas	0′	11″		
6.	Bone	0	5		
7.	Coal, gas	0	8		
8.	Bone	0	2¼		
9.	Slate	0	0½		
10.	Coal, gas	0	3½		
11.	Slate	0	0¼		
12.	Coal	0	3½	4	6
13.	Slate				

"Coal owned by Stewart Wood and S. W. Patterson; principal office, Gary, W. Va.; mine will be in operation January 1, 1914, with a daily output of about 100 tons; sample collected from Nos. 2, 3, 4, 5, 7, 10 and 12 of section at face of Main Entry, 200′ from pit mouth, by R. M. Gawthrop; E. H. Gates, Foreman, authority for data."

The composition of the sample is published under Mine No. 18 in the table at the end of this Chapter.

Williamson, Magnolia and Stafford Districts, Mingo County.

In **Williamson District,** the Coalburg Coal is reported 5′ 6″ thick in the section for Williamson, published in Chapter IV. No other prospects were observed, but Map II shows that its horizon is present in the long ridge that half surrounds the district on the north and east. Its presence in good thickness in Lee District on both sides of Williamson, and in the section mentioned above, indicates that the Coalburg Coal is probably of minable thickness all along its outcrop.

In **Magnolia District,** no prospects were observed in the Coalburg Coal. As shown by Map II, its outcrop is so high in the hills that little or no attempt has been made to prospect it. Its presence in the other districts of Mingo County immediately northwest of Magnolia, where it is nearly always of good thickness, indicates that prospecting in Magnolia District would probably show a large amount of this coal.

In **Stafford District,** as shown by Map II, the Coalburg Coal crops only in a few high hills in the northwestern corner. No prospects were observed. The coal may be present in these hills, but the amount of its acreage is so small that it can not be reckoned as an important commercial asset of the district.

Quantity of Coalburg Coal Available.

The Coalburg Coal has been prospected so frequently over a large part of the two counties that its extent and character are reasonably well defined, except in Triadelphia District, Logan County, and Magnolia District, Mingo County, where its presence is still in doubt owing to the lack of prospects. The following table, based on a planimetric determination of its acreage by Gawthrop from Map II, and with thickness estimated from the evidence of the preceding pages, shows the probable amount of Coalburg Coal. The amount already mined is so small that it is neglected in this estimate, but a deduction has been made from the average thicknesses on account of the big slate which is usually about one foot thick:

Probable Amount of Coalburg Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	..		....	....	....
Logan	4	90.40	57,856	10,080,829,440	403 233,177
Triadelphia	4	23.80	15,232	2,654,023,680	106,160 947
Totals	....	114.20	73,088	12,734,853,120	509 394,124
Mingo:					
Harvey	4	22.00	14,080	2,453,299,200	98,131,968
Warfield	4	14.76	9,447	1,646,045,280	65 841,811
Hardee	5	29.80	19,072	4,153,881,600	166,155,264
Lee	5	20.64	13,209	2,876,920,200	115 076,808
Williamson	5	0.25	160	34,848,000	1,393,920
Magnolia	5	6.90	4,416	961,804,800	38,472,192
Stafford	5	2.06	1,318	287,060,400	11,482,416
Totals	....	96.41	61,702	12,413,859,480	496,554,379
Totals for both Counties......		210.61	134,790	25,148,712,600	1.005,948,503

THE BUFFALO CREEK COAL.

The Buffalo Creek Coal, described briefly in Chapter VI, was found to be of minable thickness only in Lee District, Mingo County, where it has been mined extensively. The coal is usually composed of alternate layers of splint and gas coal with a small slate or bone parting in the lower half. In the districts farther west, the coal thins out so that it is not important.

The crop of the Buffalo Creek Coal is not shown on Map II, but Figure 8 shows the region where it is of known or supposed value.

Chapmanville District, Logan County.

In Chapmanville District, the Buffalo Creek Coal was not observed. Since this district is in the region of northwestward thinning, it is not likely that the Buffalo Creek Coal is of value.

Logan District, Logan County.

In Logan District, the Buffalo Creek Coal is present at some points along the Coalburg Syncline, but it is not thick enough to be commercially valuable.

In Chapter IV, it is noted in the section for Clothier, where it is 2 feet thick. In Chapter VI, it is noted in the section for Beech Creek, where it is 3′ 2″ and in that for Stollings, where it is 1′ 6″.

In the present Chapter, it is noted in the Boone County Coal Corporation's Coal Test No. 6 (No. 57 on Map II), where it is 3′ thick, and in Coal Test No. 3 (No. 59 on Map II) of the same Company, where it is 1′ 1″ thick.

The scarcity of exposures and their thinness where found indicate that the Buffalo Creek Coal should not be regarded as a commercial asset of Logan District.

Triadelphia District, Logan County.

In Triadelphia District, the only point where the Buffalo Creek Coal was observed was at Manbar, where its blossom

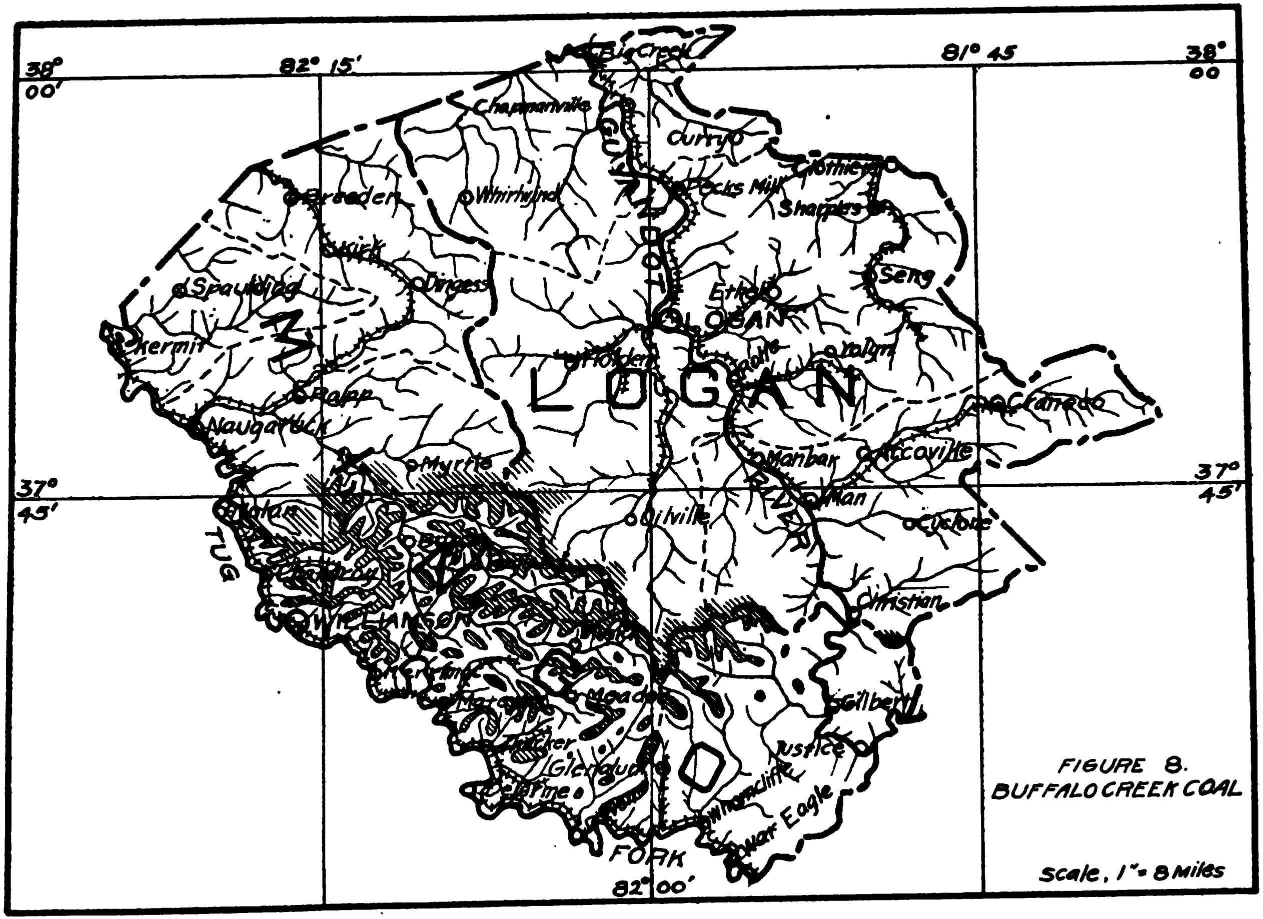

Figure 8. Showing Approximate Minable Area of Buffalo Creek Coal. (See explanation in Authors' Preface.)

was found and noted in the section for that place, published in Chapter IV.

It is possible that some areas of the coal may exist in the southern part of Triadelphia District, but its presence in abundant quantity is not probable.

Harvey, Warfield, and Hardee Districts, Mingo County.

In the three western districts of Mingo County, the Buffalo Creek Coal was not observed. Since these districts are in a region where the Kanawha Series is much thinner than in Lee District, where the Buffalo Creek Coal is known to be present, and since prospecting has failed to reveal it, the absence of this coal in merchantable quantity may be considered certain.

Lee District, Mingo County.

In Lee District, the Buffalo Creek Coal attains its best development within the two counties, and furnishes an excellent quality of gas and splint coal.

In Chapter IV, it is noted in the sections for Ragland, Chattaroy, and Sprigg, and in Chapter VI, it is noted in the section for Hatfield P. O.

The following mine, now abandoned, was visited by Hennen several years ago, and the information then secured was published in Volume II(A), pages 415-416, of the State Survey Reports. It is republished here for the sake of convenience:

Culross Coal Co. Mine (Abandoned)—No. 20 on Map II.

On Tug Fork, 1.1 miles southeast of Nolan; **Buffalo Creek Coal;** elevation, 1160′ B.

			Feet	Inches
1.	Sandstone			
2.	Soft fire clay	0″ to	0	1
3.	Coal, splint	1′ 6″		
4.	Coal, soft ("boring streak")	0 1		
5.	Coal, splint	2 2	3	9
6.	Slate, sandstone, and concealed, to N. & W. Ry., 645′ A.T.		515	0

"Butts, N. 50° W.; faces, S. 40° W; greatest rise, S. 50° E; mine capacity, 35 tons; men employed, 10; coal shipped east and west for domestic purposes; authority for mine data, Frederic Rabe, Mine Foreman; sample from Nos. 3, 4, and 5, for analysis."

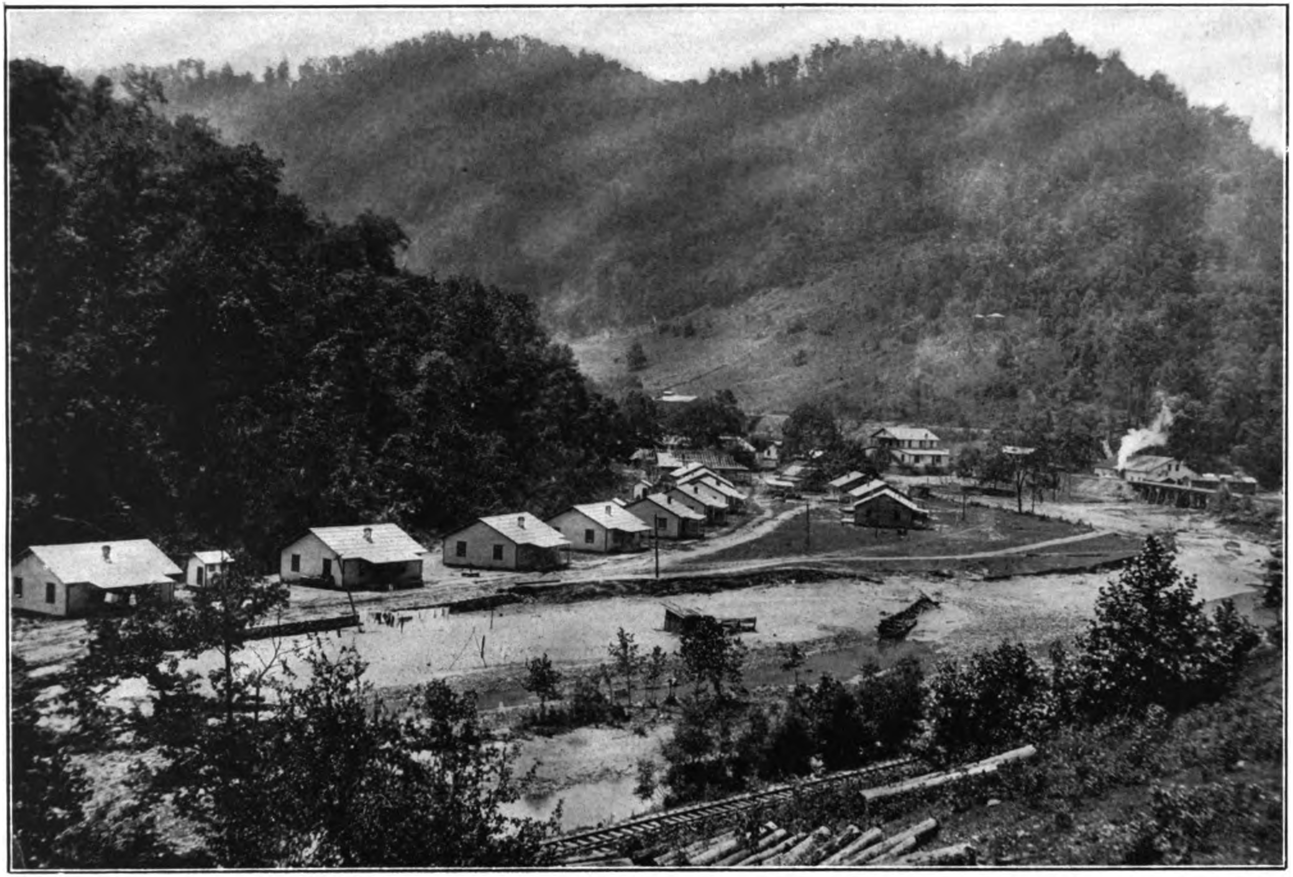

PLATE IX.—Mining town of Sharples and electric power plant of The Spruce Fork Power Company, Logan County. (See page 10). Topography of Kanawha Series.

The analysis of this coal is given under Mine No. 20 in the table at the end of this Chapter.

The following information was secured by Hennen and published in Volume II(A), page 416, of the State Survey Reports, under the name of the **Hatfield Colliery Company.** The name of the mine has been changed, as will appear below:

Mary Helen Coal Co. Mine—No. 21 on Map II.

On Tug Fork, 0.5 mile east of Hatfield; **Buffalo Creek Coal;** elevation, 1200′ B.

				Feet	Inches
1.	Sandstone				
2.	Coal, semi-splint	0′	7″		
3.	Slate, gray, 2½″ to	0	3		
4.	Coal, splint	1	9		
5.	Bone	0	2		
6.	Coal, splint	1	11	4	8
7.	Slate				

"Butts, S. 45° E.; faces, N. 45° E.; greatest rise, N. 45° W.; mine capacity, 175 tons; men employed 35; coal shipped east and west for steam and domestic purposes; authority for mine data C. C. New, Mine Foreman; sample from Nos. 2, 4 and 6, for analysis."

The composition of this sample is given under Mine No. 21 in the table at the end of this Chapter.

The following mine was examined by Hennen and the data secured were published under the name of the Lingo-Hocken Coal Company in Volume II(A), page 418, of the State Survey Reports. The name has since been changed to that published below:

Howard Jr. Colliery Co., Howard Jr. Mine—No. 22 on Map II.

On Buffalo Creek, 1.3 miles northeast of Chattaroy; **Buffalo Creek Coal;** elevation, 1280′ B.

				Feet	Inches
1.	Sandstone				
2.	Coal, splint, hard	2′	6″		
3.	Coal, gas	0	2		
4.	Coal, splint, hard	2	5½	5	1½
5.	Slate				

"Butts S. 40° E.; faces, N. 50° E.; greatest rise, S. 40° E.; mine capacity, 200 tons; men employed, 60; coal shipped mostly west for steam and domestic purposes; authority for mine data, J. H. Gent, Mine Foreman; sample from Nos. 2, 3 and 4 for analysis."

The composition of this sample is published under Mine No. 22 in the table at the end of this Chapter.

The following mine was examined by Hennen and the data published in Volume II(A), page 418, of the State Survey Reports:

Buffalo Collieries Co. Mine—No. 23 on Map II.

On Buffalo Creek, 0.8 mile northeast of Chattaroy; **Buffalo Creek Coal**; elevation, 1248′ B.

				Feet	Inches
1.	Coal, splint, with partings, **Stockton-Lewiston ? (Coalburg)**			4	6
2.	Sandstone and concealed sandstone			75	0
3.	Coal, splint, hard	1′	10″		
4.	Coal, gray, hard	0	3		
5.	Coal, gas	0	3		
6.	Coal, gray, splint, hard	0	2		
7.	Coal, splint	2	0		
8.	Slate, ½″ to	0	0¾		
9.	Coal, slaty, sulphurous, 3″ to	0	5	4	11¾
10.	Slate				

"Butts, N. 60° E.; faces, S. 40° W.; greatest rise, S. 40° E.; mine capacity, 300 tons; men employed, 60; coal shipped east and west for steam and domestic purposes; authority for mine data, T. C. Barger, Secretary and Treasurer; sample from Nos. 2, 3, 4, 5 and 6 for analysis."

The composition of this sample is published under Mine No. 23 in the table at the end of this Chapter.

At the time this section was made there was doubt as to the proper correlation of the coals of this region. The field studies for the present report show that the upper coal, 75 feet above the Buffalo Creek, is not the Stockton-Lewiston, but the Coalburg.

The information concerning the following mine, secured by Hennen, was published under the name of the **Chattaroy Colliery Company** in Volume II(A), page 417, of the State Survey Reports. The name has been changed as appears below:

Howard Collieries Co., Frederick Mine—No. 24 on Map II.

On Buffalo Creek, 0.7 mile southeast of Chattaroy; **Buffalo Creek Coal**; elevation, 1240′ B.

					Feet	Inches
1.	Sandstone				30	0
2.	Coal	5′	3″	**Stockton-Lewiston-Belmont... (Coalburg)**	9	3
3.	Shale and fire clay	2	6			
4.	Coal, splinty, sulphurous	1	6			

				Feet	Inches
5.	Blue slate and sandstone, massive			70	0
6.	Coal, splint	2′	6″		
7.	Coal, gas	0	6½		
8.	Fire clay, gray	0	2		
9.	Coal, splint	2	4		
10.	Slate, gray	0	0½		
11.	Coal, splint	0	5	6	0

"Butts, N 40° W.; faces, S. 50° W.; greatest rise, S. 40° E.; mine capacity, 500 tons; men employed, 100; coal shipped mostly west for steam and domestic purposes; authority for mine data, W. S. Tabor, Engineer; sample from Nos. 6, 7 and 9 for analysis."

The composition of this sample is given under Mine No. 24 in the table at the end of this Chapter. As in the preceding mine, the name of the Stockton Coal is changed to the Coalburg to agree with recent information.

The following information, secured by Hennen, was published in Volume II(A), page 419, of the State Survey Reports:

Howard Collieries Co., Howard Mine—No. 25 on Map II.

On South Fork of Buffalo Creek, 2.2 miles northeast of Chattaroy; **Buffalo Creek Coal**; elevation, 1335′ B.

				Feet	Inches
1.	Sandstone				
2.	Draw slate				
3.	Coal, splint, hard	2′	7″		
4.	Coal, gas	0	5		
5.	Coal, splint, hard	2	4		
6.	Slate, gray	0	1½		
7.	Coal, splinty	0	1½	5	7
8.	Slate				

"Butts, S. 40° E.; faces, N. 50° E.; greatest rise, S. 40° E.; mine capacity, 250 tons; men employed, 40 to 50; coal shipped east and west for steam and domestic purposes; authority for mine data, W. H. Pirsung, Bookkeeper; sample from Nos. 3, 4 and 5 for analysis"

The composition of this sample is given under Mine No. 25 in the table at the end of this Chapter.

The three following mines show a good development of the Buffalo Creek Coal:

E. L. Sternberger Coal Co., Goodman Mine—No. 26 on Map II.

On Sugartree Creek, 1.3 miles east of Goodman; **Buffalo Creek Coal**; elevation, 1275′ B.

				Feet	Inches
1.	Sandstone, massive			15	0
2.	Coal, gas, hard	0′	8″		
3.	Coal, semi-splint	1	7		
4.	Coal, splint	0	5		
5.	Coal, semi-splint	0	4		
6.	Coal, gas	0	6		
7.	Shale, 2′ 8″ to 0′ 3″	1	0		
8.	Bone	0	2		
9.	Coal, semi-splint	0	8		
10.	Coal, gas, hard	1	0	6	4
11.	Shale				

"Coal owned by Thomas Stepp Heirs; principal office, Cincinnati, Ohio; daily capacity, 500 tons; daily output, 450 tons; 30 laborers and 40 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped west; no butts or faces; greatest rise, southeast; sample collected from Nos. 2, 3, 4, 5, 6, 9 and 10 of section at face of Second Left Entry of No. 5 opening, by R. M. Gawthrop; O. B. Gould, General Manager, authority for data."

The composition of the sample is published under Mine No. 26 in the table at the end of this Chapter.

Sycamore Coal Co., Cinderella No. 2—No. 27 on Map II.

On Sycamore Creek, at Cinderella; **Buffalo Creek Coal**; elevation, 1367′ L.

				Feet	Inches
1.	Shale, silicious			10	0
2.	Coal, gray splint	0′	6″		
3.	Coal, semi-splint	0	7		
4.	Coal, gray splint	0	6		
5.	Coal, semi-splint	1	2		
6.	Coal, gray splint	0	6		
7.	Coal, gas, hard	1	10	5	1
8.	Shale				

"Coal owned by Sycamore Coal Co.; principal office, Vivian; daily capacity, 800 tons; daily output 600 tons; 57 laborers and 44 miners employed; electric haulage; used for steam and domestic fuel; shipped east and west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 3, 4, 5, 6, and 7 of section in Room No. 1 off First Left Entry, by R. M. Gawthrop; Evan Thomas, Superintendent, authority for data."

The composition of the sample is published under Mine No. 27 in the table at the end of this Chapter.

Crystal Block Coal and Coke Co. Mine—No. 28 on Map II.

On Dick Williamson Branch, 1.6 miles northeast of Rawl; **Buffalo Creek Coal**; elevation, 1475' L.

				Feet	Inches
1.	Sandstone, massive			20	0
2.	Coal, gas, hard	1'	6"		
3.	Coal, semi-splint	1	6		
4.	Coal, splint	0	9		
5.	Coal, gas	0	9		
6.	Shale, 2' 0" to	0	3		
7.	Coal, gas, hard	0	7½		
8.	Coal, splinty	0	9		
9.	Coal, gas	0	9	6	10½
10.	Shale				

"Coal owned by Stewart Wood and S. W. Patterson; principal office; Gary; daily capacity, 700 tons; daily output, 400 tons; 15 laborers and 35 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped west; no butts or faces; greatest rise southeast; sample collected from Nos. 2, 3, 4, 5, 7, 8, and 9 of section, at face of No. 1 Left Heading, 1,500 feet from opening, by R. M. Gawthrop; E. H. Gates, Foreman, authority for data."

The composition of the sample is published under Mine No. 28 in the table at the end of this Chapter.

The two following openings in the coal were examined by Hennen farther up Tug Fork:

Coal Opening—No. 217 on Map II.

On a short branch of Tug Fork, 0.6 mile northeast of Merrimac; **Buffalo Creek Coal**; elevation, 1570' B.

	Feet	Inches
Sandstone, massive		
Coal, splint	4	5
Slate		

Coal Opening—No. 218 on Map II.

On Caney Branch of Tug Fork, 0.5 mile east of Merrimac; **Buffalo Creek Coal**; elevation, 1615' B.

			Feet	Inches
Sandstone, massive			8	0
Coal, splint	0'	4"		
Slate, gray	0	0¼		
Coal, splint	4	0	4	4¼
Slate, gray			1	6
Concealed				

Williamson District, Mingo County.

In Williamson District, the Buffalo Creek Coal is noted in the section for Williamson, published in Chapter IV, and the following commercial mine is being operated:

Williamson Coal and Coke Co., Williamson Mine No. 3—No. 29 on Map II.

On Williamson Creek, 1.3 miles northeast of Williamson; Buffalo Creek Coal; elevation, 1332′ L.

				Feet	Inches
1.	Sandstone, massive				
2.	Coal, gray, splint	0′	6½″		
3.	Coal, semi-splint	1	3		
4.	Coal, gray splint	0	5		
5.	Coal, semi-splint	0	4		
6.	Coal, gas, hard	1	0		
7.	Slate, dark, 0′ 1″ to	0	4½		
8.	Coal, splinty	0	8		
9.	Coal, gas, hard	0	9	5	4
10.	Shale				

"Coal owned by Williamson Mining and Manufacturing Co.; principal office, Williamson; daily capacity, 500 tons; daily output, 500 tons; 80 laborers and miners employed; mule and electric haulage; used for steam and domestic fuel; shipped west; no regular butts or faces; greatest rise, southeast; all coal under 3″ is washed at tipple; sample collected from Nos. 2, 3, 4, 5, 6, 8 and 9 of section in Straight one Room in No. 1 Drift of Mine No. 3, by R. M. Gawthrop; E. L. Bailey, President and General Manager, authority for data."

The composition of the sample is published under Mine No. 29 in the table at the end of this Chapter.

Magnolia and Stafford Districts, Mingo County.

In Magnolia District, the Buffalo Creek Coal was not found in minable quantity, although its horizon belongs in the hills. It is probable that it exists in good thickness, but the lack of prospects leaves it uncertain. In Chapter IV, the section for Matewan notes its blossom, which was the only point at which this coal was observed.

In Stafford District, the horizon of the Buffalo Creek Coal belongs high in the hills in the western part and is above them entirely in the southeastern end. The coal was not observed, but probably occurs in these hill tops.

Quantity of Buffalo Creek Coal Available.

Since the Buffalo Creek Coal was found in minable quantity only in Lee and Williamson Districts, Mingo County, and is not believed to be of commercial thickness north and west of these districts, but is probably good southeastward, only four districts are included in the following summary. The amount of its acreage was determined by interpolation between the Coalburg and Chilton Coals as cropped on Map II.

Probable Amount of Buffalo Creek Coal.

Mingo County by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Lee	5	29.00	18,560	4,042,368,000	161,694,720
Williamson	5	0:45	288	62,726,400	2,509,056
Magnolia	5	13.00	8,320	1,812,096,000	72,483,840
Stafford	5	4.00	2,560	557,568,000	22,302,720
Totals.....		46.45	29,728	6,474,758,400	258,990,336

THE WINIFREDE COAL.

The Winifrede Coal, described briefly on pages 142-3, Chapter VI, which is mined extensively in the Great Kanawha Valley at Winifrede and other points, is not an important coal in Logan and Mingo. Only a few prospects showing coal of minable thickness and purity were found, although the hills have been searched thoroughly for it. It is not mined commercially in the two counties. Its crop is not shown on Map II, but on Figure 9 the areas where it is possibly of minable thickness are shown.

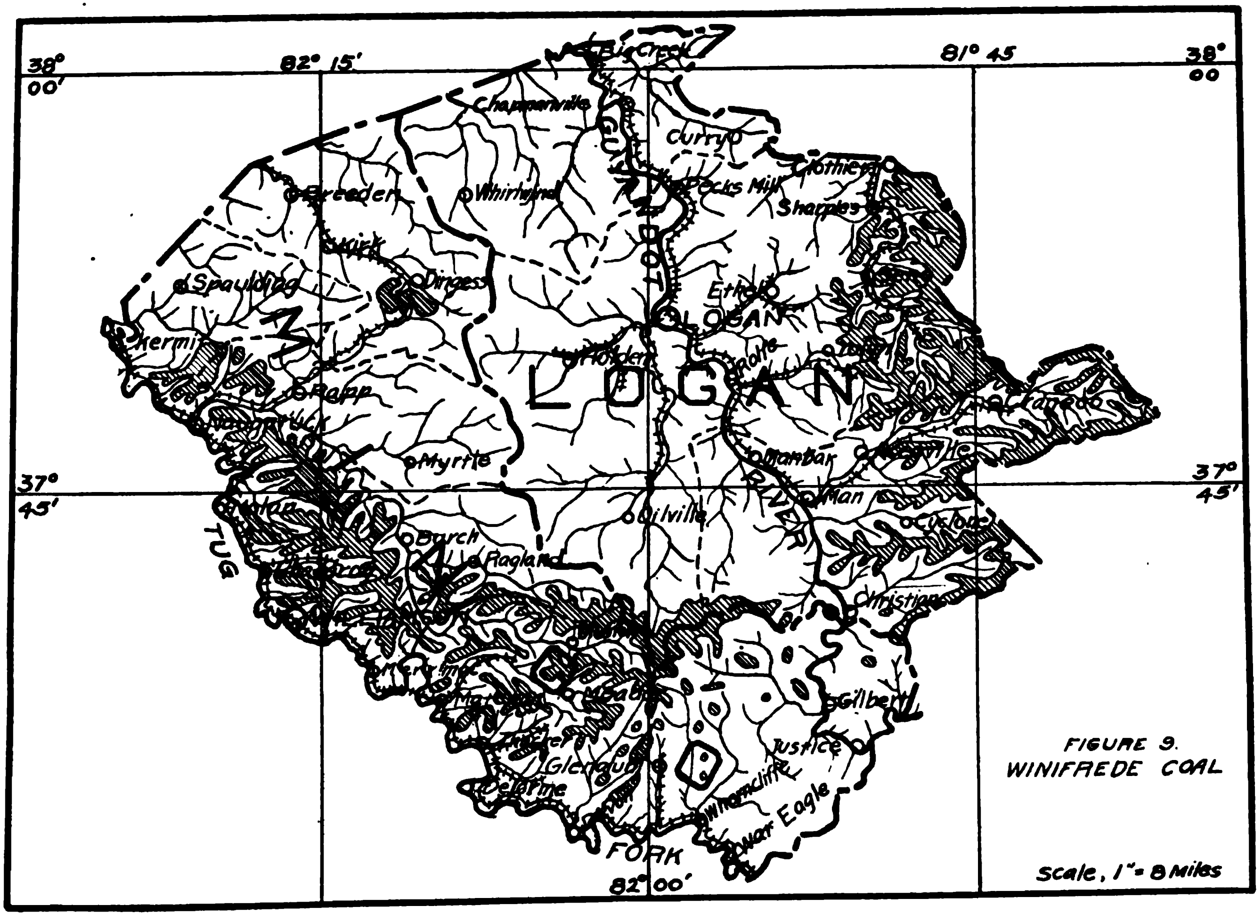

Figure 9. Showing Approximate Minable Area of Winifrede Coal. (See explanation in Authors' Preface.)

Chapmanville District, Logan County.

In Chapmanville District, the Winifrede Coal was not observed, although its horizon was often crossed along the highways across the ridges and search was also made in the ravines. A section of this coal at Ferrellsburg, Lincoln County, is given in this Chapter under the description of the Coalburg Coal, and it was observed at a few other points across the Lincoln Line. It is noted in Chapter IV in the section for the corner of Logan, Lincoln and Mingo Counties, where it crops in the corner of Lincoln County one foot thick. The absence of outcrops of this coal in Chapmanville District leads to the belief that extensive deposits of it in minable thickness will not be found.

Logan District, Logan County.

In Logan District, a few prospects were observed in the Winifrede Coal along the Coalburg Syncline, and also in the extreme southern end of the district.

In Chapter IV, it is noted in the section for Clothier, and in Chapter VI, it is given in those for Beech Creek, Stollings, Rum Creek, and Mud Fork.

In the present Chapter, it is noted in the records of Coal Test Borings Nos. 57 and 59.

The following exposure of the coal was noted by Hennen in the Coal River region:

Coal Opening—No. 219 on Map II.

On Seng Camp Creek, 2.4 miles southeast of Sharples; **Winifrede Coal**; elevation, 1275′ B.

	Feet	Inches
Concealed		
Shale	0	6
Coal, splinty	3	2
Fire clay		

The following opening was examined by Gawthrop along the same stream:

Paris Jarrold Heirs Opening—No. 30 on Map II.

On Seng Camp Creek, 3 miles southeast of Sharples; **Winifrede Coal**; elevation, 1315′ B.

				Feet	Inches
1.	Sandstone			4	0
2.	Shale			0	7
3.	Coal, soft	1′	10″		
4.	Slate, black	0	1½		
5.	Coal, harder	1	2	3	1½
6.	Slate				

A sample was collected from Nos. 3 and 5 of section, the composition of which is given under Mine No. 30 in the table at the end of this Chapter.

The following opening was examined by Hennen farther southwest:

Coal Opening—No. 220 on Map II.

On Whites Trace Branch of Spruce Fork, 1 mile southwest of Seng; **Winifrede Coal**; elevation, 1160′ B.

			Feet	Inches
Sandstone				
Fire clay shale			5	0
Coal, slaty	0′	2″		
Sandstone, flaggy	3	4		
Coal, gas	0	3		
Bone	0	2½		
Coal, gas	0	6½		
Slate, dark	0	2		
Coal, gas, hard	1	4		
Slate, gray	0	1		
Coal, splint	1	6	7	7
Pavement concealed				

At **Prospect No. 221 on Map II,** located on Adkins Fork of Spruce Fork, 1.3 miles S. 10° W. of Seng, according to Hennen the Winifrede Coal was reported by Bruce Williams to be 3 feet thick with 2 inches of black bone near the middle. The opening had fallen shut.

In the southwestern part of Logan District, at the head of Cow Creek, 3 miles southwest of Oilville, Gawthrop observed one foot of Winifrede Coal at the foot of the mountain road, at an elevation of 1530′ B.

On the extreme head of Island Creek, Hennen observed the two following openings:

Coal Opening—No. 222 on Map II.

On the head of Island Creek, 0.7 mile northeast of Calico; **Winifrede Coal**; elevation, 1685′ B.

			Feet	Inches
Sandstone, massive, yellowish gray, medium grained			12	0
Coal, gas	0′	5″		
Slate, gray 0″ to	0	0½		
Coal, gas	0	3		
Fire clay shale	0	5		
Coal, semi-splint	1	3		
Coal, splint, gray, hard	3	0	5	4½
Slate				

Coal Opening—No. 223 on Map II.

On the head of Island Creek, 0.9 mile northeast of Calico; **Winifrede Coal**; elevation, 1720′ B.

			Feet	Inches
Sandstone, massive, yellowish gray			6	0
Coal, gas	0′	1″		
Slate	0	0½		
Coal, gas	0	2½		
Coal, gas	0	2½		
Coal, splint, hard	3	1	3	7
Slate				

Triadelphia District, Logan County.

In Triadelphia District, little is known concerning the Winifrede Coal. Its blossom is noted in Chapter IV in the section for Manbar, and on Mudlick Branch of Buffalo Creek, Hennen noted a heavy blossom 0.5 mile N. 10° E. of Amherst, at an elevation of 1485′ B.

The coal was reported 5′ thick at **Prospect No. 224 on Map II,** on Elklick Branch of Buffalo Creek, 4 miles S. 70° E. of Craneco, at an elevation of 2030′ B., but the prospect had fallen shut and could not be verified when visited by Hennen.

Harvey District, Mingo County.

In Harvey District, the Winifrede Coal was noted but seldom. In Chapter IV, it is reported by Dr. White in the section for Hale and in the Dingess Section, where there is an abandoned opening at **Prospect No. 225 on Map II,** 0.4 mile south of Dingess. It had fallen shut, but Mr. Harvey, the Dingess hotelkeeper, reports the coal 4′ thick. No other outcrops were seen.

Warfield District, Mingo County.

In Warfield District, only a few outcrops of the Winifrede Coal were seen. In the section for Kermit, published in Chapter IV, only a streak of coal is noted at this horizon.

The following section of the coal, at a prospect that had fallen shut when visited by Reger, is reported by Jesse Parsley, who once opened it:

Coal Prospect—No. 226 on Map II.

On Marrowbone Creek, 2 miles northeast of Kermit; **Winifrede Coal**; elevation, 1235′ B.

			Feet	Inches
Sandstone				
Coal	2′	2″		
Bone	0	4		
Coal	2	6	5	0

A little farther up Marrowbone Creek at **Prospect No. 227 on Map II,** 3 miles N. 75° E. of Kermit, at a tidal elevation of 955′ B., the coal could not be seen when visited by Reger, but its elevation indicates that it is the Winifrede Coal.

The following opening was examined by Hennen and Reger along the Norfolk & Western Railway. Coal from this place was used in construction work when the railroad was built:

Coal Opening—No. 228 on Map II.

On Tug Fork, 1.7 miles southeast of Kermit; **Winifrede Coal**; elevation, 845′ B.

			Feet	Inches
Sandstone, massive, great cliff				
Coal, splint	1′	6″		
Slate, black	0	1		
Coal	0	4		
Shale, gray, 5″ to	1	1		
Coal, splint	0	7		
Shale, gray	1	7		
Coal, splint	1	2	6	4
Fire clay				

The following exposure was examined by Reger:

Coal Prospect—No. 229 on Map II.

On Parsley Big Branch of Tug Fork, 2 miles northwest of Naugatuck; **Winifrede Coal**; elevation, 865′ B.

	Feet	Inches
Sandstone, massive		
Coal	2	0
Fire clay pavement		

Hardee District, Mingo County.

In Hardee District, the Winifrede Coal was not found generally present, though a few openings were observed.

The following prospect was examined by Hennen near the Hardee-Warfield District Line:

Coal Prospect—No. 230 on Map II.

On Tug Fork, 1.6 miles northwest of Naugatuck; **Winifrede Coal**; elevation, 860′ B.

			Feet	Inches
Sandstone, massive, great cliff				
Coal, splint	1′	10″		
Shale, gray	0	2		
Coal, gas	0	4		
Shale, gray	0	4		
Coal, splint	0	4	3	0
Sandstone, massive				

The two following prospects were examined by Reger along Pigeon Creek:

Coal Prospect—No. 231 on Map II.

On Pigeon Creek, 0.8 mile N. 75° W. of Eugene; **Winifrede Coal**; elevation, 935′ B.

			Feet	Inches
Sandstone, massive				
Shale			4	0
Coal	1′	4″		
Shale	0	3		
Coal	0	2	1	9
Fire clay				

Coal Prospect—No. 232 on Map II.

On Pigeon Creek, 0.6 mile northwest of Eugene; **Winifrede Coal;** elevation, 925′ B.

			Feet	Inches
Sandstone, massive				
Shale			4	0
Coal	0′	6″		
Sandstone	1	0		
Coal	1	2	2	8
Fire clay				

The following exposure was noted by Reger along a branch:

Coal Prospect—No. 233 on Map II.

On a branch of Laurel Fork of Pigeon Creek, 0.6 mile southeast of Canterbury; **Winifrede Coal;** elevation, 1020′ B.

	Feet	Inches
Sandstone, massive, about	100	0
Concealed and shale	2	0
Coal	1	6
Shale, gray		

In the southern end of Hardee District, the Winifrede Coal is opened for farm use where Reger obtained the following:

John Deskins Farm Mine—No. 31 on Map II.

On Road Branch of Tug Fork, 1.8 miles S. 75° E. of Maher Station; **Winifrede Coal;** elevation, 1025′ B.

				Feet	Inches
1.	Sandstone, massive				
2.	Coal, splint	1′	10″		
3.	Coal, gas	0	9	2	7
4.	Shale				

A sample was collected from Nos. 2 and 3 of section, the composition of which is published under Mine No. 31 in the table at the end of this Chapter. The analysis shows a fine coal, low in ash, sulphur, and phosphorus.

Lee District, Mingo County.

In Lee District, only a few prospects were observed at the Winifrede horizon, but some of these show good coal. In the

Chattaroy region, where a diligent search has been made by the coal operators, no Winifrede Coal is reported. In Chapter IV, it is noted 2′ 9½″ thick in the section for Sprigg.

The following prospect was examined by Reger:

Melvin Justice Prospect—No. 32 on Map II.

On Spring Branch of Rockhouse Fork of Pigeon Creek, 1.3 miles southeast of Burch; **Winifrede Coal**; elevation, 1890′ B.

				Feet	Inches
1.	Sandstone, massive			80	0
2.	Shale, gray			1	0
3.	Coal, slaty	0′	5″		
4.	Coal, soft	2	5		
5.	Coal, semi-splint	2	4	5	2
6.	Sandstone				

A sample was collected from Nos. 4 and 5 of section, the composition of which is published under Mine No. 32 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

The following prospect was examined by Gawthrop farther up the same fork:

Coal Prospect—No. 234 on Map II.

On Big Pigeonroost Branch of Rockhouse Fork, 1.7 miles southeast of Ragland; **Winifrede Coal**; elevation, 1325′ B.

			Feet	Inches
Shale, gray				
Coal, medium hard	0′	10″		
Coal, harder	1	0		
Bone	0	1		
Coal, splint	1	10	3	9
Shale				

The blossom of the coal was observed at a few other points on Rockhouse Fork and Main Pigeon Creek, but the sections of the coal could not be obtained.

Williamson, Magnolia and Stafford Districts, Mingo County

In **Williamson District**, the Winifrede Coal was not observed, and its existence there in minable quantity can only be determined by further prospecting.

In **Magnolia District,** few prospects in the Winifrede Coal were observed. The section for Matewan, published in Chapter IV, notes its blossom. Its outcrop is high in the hills.

The following opening was observed by Gawthrop in the east end of the district:

Coal Opening—No. 235 on Map II.

On the head of Pigeon Creek, 1 mile southeast of Calico; **Winifrede Coal**; elevation, 1795' B.

			Feet.	Inches.
Sandstone, massive			10	0
Shale, gray			3	0
Coal, gas	0'	5"		
Coal, bony	0	4		
Shale, gray	0	4		
Coal, gas	2	2		
Coal	1	6	4	9
Slate				

In **Stafford District,** the Winifrede Coal lies high in the hills in the western part and is entirely above them in the eastern end. The following opening, examined by Gawthrop, is the only one observed in the district:

Coal Opening—No. 236 on Map II.

On the head of Left Fork of Bens Creek, 1 mile southeast of Calico; **Winifrede Coal**; elevation, 1800' B.

			Feet.	Inches.
Sandstone, massive			5	0
Coal, gas	0'	4"		
Coal, bony	0	4		
Shale	0	3		
Coal, gas, hard	2	0		
Coal, splinty	1	6	4	5
Slate				

Quantity of Winifrede Coal Available.

Based on the evidence furnished in the preceding pages, the following estimate is made of the probable amount of the Winifrede Coal. As its crop is not shown on Map II, the probable area is interpolated by Gawthrop from the crops of the Coalburg and Chilton Coals:

Probable Amount of Winifrede Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	..	......	......	....	....
Logan	2	150.00	96,000	8,363,520 000	334,540,800
Triadelphia	2	44.00	28,160	2,453,299,200	98,131 968
Totals	....	194.00	124,160	10,816,819,200	432,672,768
Mingo:					
Harvey	2	42.00	26,880	2,341,785 600	93,671,424
Warfield	2	23.60	15,104	1,315,860,480	52,634,419
Hardee	2	46.00	29,440	2,564,812,800	102,592,512
Lee	2	36.00	23,040	2,007,244,800	80,289,792
Williamson	2	0.65	416	36,241,920	1,449,676
Magnolia	3	17.50	11,200	1,463,616,000	58,544,640
Stafford	3	5.70	3,648	476,720,640	19,068,825
Totals........	....	171.45	109,728	10,206,282,240	408,251,288
Totals for both Counties........		365.45	233,888	21,023,101,440	840,924,056

THE CHILTON "A" COAL.

The Chilton "A" Coal, which has been briefly described in Chapter VI, pages 146-7, like the Winifrede above it, is irregular in its development, sometimes showing a minable thickness, but usually being thin and sometimes absent. Its crop is not shown on Map II, but it is only 20 to 80 feet above the Chilton Coal which is cropped. Figure 10 shows the areas where it is known or believed to be of minable thickness.

Chapmanville District, Logan County.

In Chapmanville District, the Chilton "A" Coal was not observed. There may be isolated streaks of it in some of the hills, but it should be disregarded as a commercial proposition.

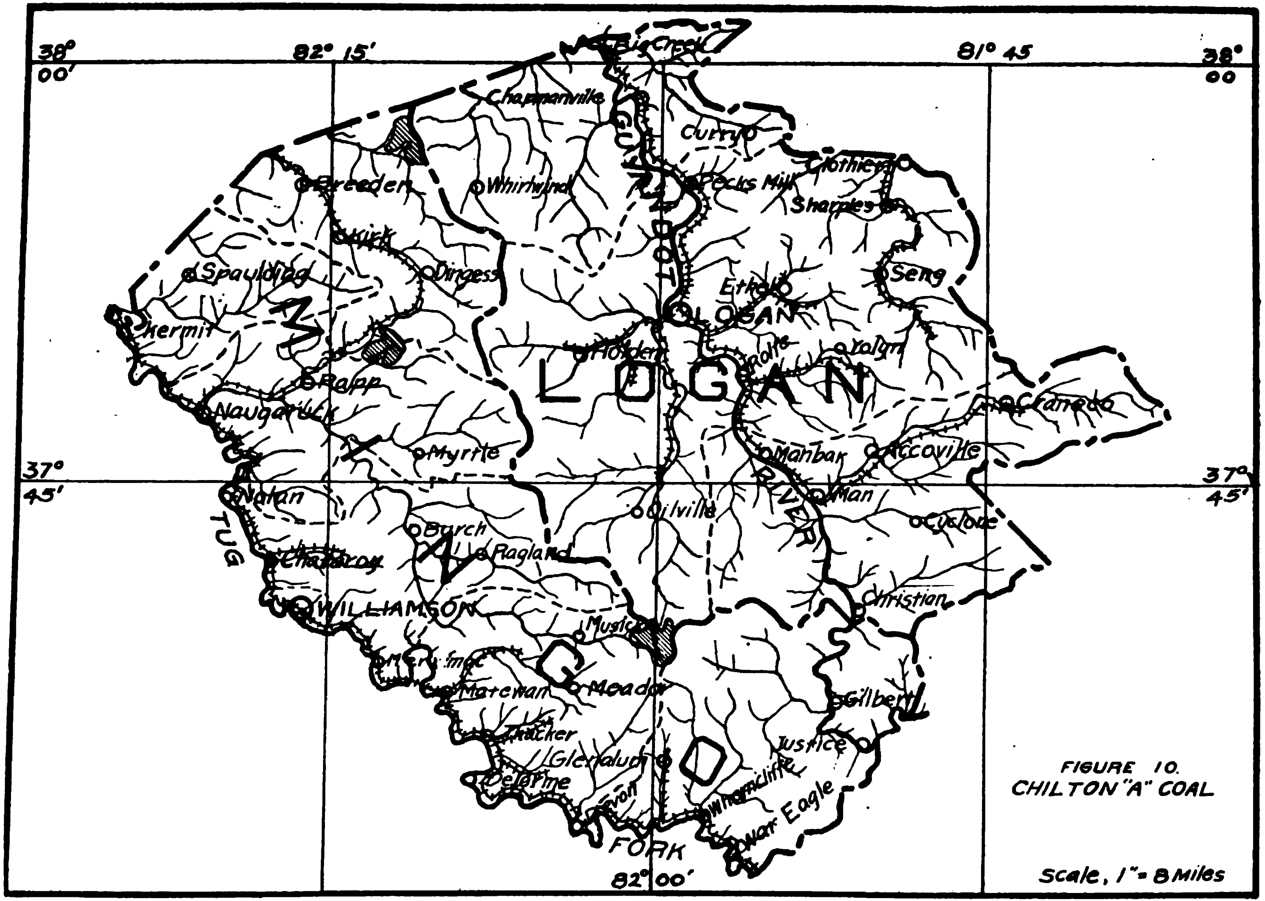

Figure 10. Showing Approximate Minable Area of Chilton "A" Coal. (See explanation in Authors' Preface.)

Logan District, Logan County.

In Logan District, the Chilton "A" Coal was noted at several localities, but the openings observed indicate that, owing to its thinness, irregularity and slate partings, commercial mining would not prove profitable in competition with the other coals of the Kanawha Series.

In Chapter IV, the Chilton "A" Coal is noted in the sections for Clothier and Ethel. In Chapter VI, it is noted in the sections for Mud Fork, Whitman, Stollings and Laurel Fork of Pine Creek. In this Chapter, it is noted in Coal Test Records Nos. 53, 59, 67 and 101.

At a few other localities, the blossom of the coal was observed, but no prospects where the coal had minable thickness were found.

Triadelphia District, Logan County.

In Triadelphia District, little evidence of the Chilton "A' Coal was found. No prospects were observed.

Harvey District, Mingo County.

In Harvey District, the Chilton "A" Coal is better developed than in any other district in the two counties. It is often too thin for mining, but on some of the creeks it shows good coal.

In Chapter IV, the coal is noted in the sections for Breeden and Hale.

In the northern end of Harvey District, this coal has been opened at **Prospect No. 237 on Map II,** at a tidal elevation of 925′ B., on the head of Alex. Branch of East Fork of Twelvepole Creek, 2.5 miles northwest of McCloud, but its section could not be measured, as the prospect had fallen shut when visited by Reger.

The Chilton "A" Coal was once opened on Trace Branch of East Fork of Twelvepole Creek at **Prospect No. 238 on Map II,** 1 mile north of McCloud, at an elevation of 1010′ B. The prospect had fallen shut when examined by Reger, but according to T. J. Maggard, a resident, the coal was 31″ thick, of which a considerable part was cannel coal. A large amount of cannel coal was visible on the dump.

The best development of Chilton "A" Coal noted in the two counties is on Breeden Creek, where several prospects have been opened, some of which carry cannel coal. The Chilton "A" Coal is from 140 to 160 feet below the Coalburg Coal, which is opened in the hill above it here.

The following prospect was examined by Reger:

Calvin Stafford Prospect—No. 239 on Map II.

On Breeden Creek, 2.4 miles S. 20° W. of Breeden; Chilton "A" Coal; elevation, 1025′ B.

			Feet	Inches
Sandstone				
Coal. soft	1′	8″		
Slate	0	0½		
Coal, splinty	1	3		
Slate, gray	0	1½		
Coal	0	5½		
Slate, gray	0	3		
Coal, splinty	1	2½	5	0
Fire clay				

Another prospect near by, examined by Reger, shows the following:

Hiram Stafford Prospect—No. 34 on Map II.

On Breeden Creek, 2.5 miles S. 20° W. of Breeden; Chilton "A" Coal; elevation, 1005′ B.

				Feet	Inches
1.	Sandstone. massive				
2.	Sandstone, shaly			3	0
3.	Coal, splint	1′	4″		
4.	Slate, gray	0	1		
5.	Coal, splint	1	0		
6.	Slate, gray	0	1		
7.	Coal, splint	0	6		
8.	Slate, gray	0	1		
9.	Coal, splinty	1	3	4	4
10.	Fire clay				

A sample was collected from Nos. 3, 5, 7, and 9 of section, the composition of which is reported under Mine No. 34 in the table at the end of this Chapter. The analysis shows the coal low in sulphur and phosphorus, but somewhat high in ash.

The following is another prospect, examined by Reger, in the same region:

H. C. Closterman Prospect—No. 33 on Map II.

On Breeden Creek, 2.4 miles southwest of Breeden; Chilton "A" Coal; elevation, 1040' B.

				Feet.	Inches.
1.	Sandstone, massive				
2.	Coal, gas	0'	11"		
3.	Slate, dark	0	6		
4.	Coal	0	3		
5.	Slate, dark	0	6		
6.	Coal, gas	0	8		
7.	Coal, cannel	1	5		
8.	Slate, gray	0	9		
9.	Coal, splint	2	3	7	3
10.	Fire clay				

A sample was collected from the cannel coal, No. 7 of section, the composition of which is published under Mine No. 33 in the table at the end of this Chapter. The volatile matter, 58.16 per cent., is extraordinarily high, even for cannel coal. The coal here has been prospected into the hill several yards, showing that the thickness of the cannel bench had a large variation in thickness.

The Chilton "A" Coal does not hold its good thickness in this region. Another prospect, examined by Reger, farther northwest, shows the following:

Coal Exposure—No. 240 on Map II.

On the head of Turkey Creek, 3 miles southwest of Breeden; Chilton "A" Coal; elevation, 1010' B.

			Feet.	Inches.
Sandstone				
Coal	0'	6"		
Shale, gray	0	4		
Coal	0	4	1	2
Fire clay				

On the Left Fork of Openmouth Branch of Twelvepole Creek, 2.1 miles southeast of Breeden, a prospect was once made at the Chilton "A" horizon, at an elevation of 1045′ B., but, according to Reger, little was found except slate.

In the southern end of Harvey District, the following prospect was examined by Reger:

Mingo Block Coal Co. Prospect—No. 241 on Map II.

On Lick Branch of Laurel Fork of Pigeon Creek, 1.5 miles southwest of Hale; Chilton "A" Coal; elevation, 1040′ B.

			Feet	Inches
Shale, dark			5	0
Coal	0′	4″		
Slate, black	0	1		
Coal, soft	1	8		
Coal, semi-splint	2	4	4	5
Fire clay, concealed, and sandstone to Chilton Coal opening			27	0

Both the Chilton "A" and the Chilton Coals are opened here. The lower prospect will be given under the Chilton Coal.

The Chilton "A" Coal was observed by Reger at the extreme southern end of Harvey District in the following prospect:

Coal Prospect—No. 242 on Map II.

On the head of Laurel Fork of Pigeon Creek, 3.2 miles northeast of Myrtle; Chilton "A" Coal; elevation, 1195′ B.

	Feet.	Inches.
Sandstone		
Shale, gray	2	0
Coal	1	2
Sandstone		

Warfield District, Mingo County.

In Warfield District, little evidence of the Chilton "A" Coal was found, and it is probably not of commercial thickness. The only prospect observed was in the northeastern end of the district. where Reger obtained the following:

Coal Prospect—No. 243 on Map II.

On the head of Jennie Creek, 2.8 miles southwest of Breeden; Chilton "A" Coal; elevation, 1030′ B.

		Feet.	Inches.
Sandstone			
Coal, slaty	0′ 5″		
Coal, cannel	0 10	1	3
Shale, gray, visible		2	0

Hardee District, Mingo County.

In Hardee District, the Chilton "A" Coal was not found in commercial thickness. In the section for Naugatuck, published in Chapter IV, it is reported 3′ 10″, with 1′ 10″ of cannel coal at the base, by M. H. Waldron, who prospected it.

The Chilton "A" Coal is reported about 2 feet thick, at an elevation of 820′ B., about 1.5 miles northwest of Naugatuck, along Tug Fork.

At the head of Den Branch, 1.8 miles east of Naugatuck, 1 foot of Chilton "A" Coal was observed by Reger at an elevation of 920′ B.

At the head of Left Fork of Riffe Branch of Trace Fork of Pigeon Creek, a prospect was once attempted in the Chilton "A" Coal, according to Reger, at an elevation of 1095′ B., but only a few pieces of coal were visible on the dump, the prospect being an evident failure.

Lee District, Mingo County.

In Lee District, a few prospects were found in the Chilton "A" Coal, but these indicate that it is too thin for commercial mining.

In Chapter IV, it is noted in the sections for Sprigg and Little Coon Knob.

The following exposure was examined by Gawthrop in the western end of the district:

Coal Exposure—No. 244 on Map II.

Along Hell Creek, 2 miles N. 75° W. of Burch; **Chilton "A" Coal**; elevation, 1045′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	0′	11″		
Shale	1	0		
Coal, hard, visible	1	0	2	11

According to Gawthrop, the coal was prospected for on Big Pigeonroost Branch of Rockhouse Fork, 1.8 miles southeast of Ragland, but little coal was found.

Williamson, Magnolia and Stafford Districts, Mingo County.

In **Williamson District,** the Chilton "A" Coal was not observed, and its existence in commercial quantity is subject to question.

In **Magnolia District,** little evidence of the coal was found. The section for Matewan, published in Chapter IV, notes its blossom.

The following opening, reported by Gawthrop, was made in the eastern end of the district:

Coal Opening—No. 245 on Map II.

On Nighway Branch of Pigeon Creek, 1.4 miles north of Calico; **Chilton "A" Coal**; elevation, 1525′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	7″		
Shale, gray	0	11		
Coal, gas, hard	2	0		
Coal, splinty	2	8	6	2
Slate				

In **Stafford District,** the Chilton "A" Coal was not observed. Its horizon is high in the hills in the western part and entirely above them in the eastern end, and possibly no attempt has been made to prospect it.

Quantity of Chilton "A" Coal Available.

Based on evidence from the preceding pages, the following estimate is made of the probable amount of Chilton "A" Coal. Its crop is not shown on Map II, but its area is interpolated by Gawthrop from the crops of the Chilton and Coalburg Coals:

Probable Amount of Chilton "A" Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville		......	....	....	....
Logan	1	162.00	103,680	4,516,300,800	180,652,032
Triadelphia	1	48.00	30,720	1 338,163,200	53,526,528
Totals..........		210.00	134,400	5,854,464,000	234,178,560
Mingo:					
Harvey	1	46.00	29,440	1,282,406,400	51,296,256
Warfield		......	....	....	....
Hardee	1	50.00	32,000	1,393,920,000	55,756,800
Lee	1	40.00	25,600	1,115,136,000	44,605,440
Williamson	1	0.73.	467	20,342,520	813,701
Magnolia	1	20.00	12,800	557,568,000	22,302,720
Stafford	1	6.60	4,224	183,997,440	7,359,897
Totals..........		163.33	104,531	4,553,370,360	182,134,814
Totals for Both Counties ...		373.33	238,931	10,407,834,360	416,313,374

THE CHILTON COAL.

The Chilton Coal, which has been briefly described in Chapter VI, is being mined extensively, principally in Logan District, Logan County, where the coal reaches its most noticeable development in the two counties. Map II shows the outcrop of the coal and Figure 11 shows the regions where it is known or believed to be of value for mining purposes.

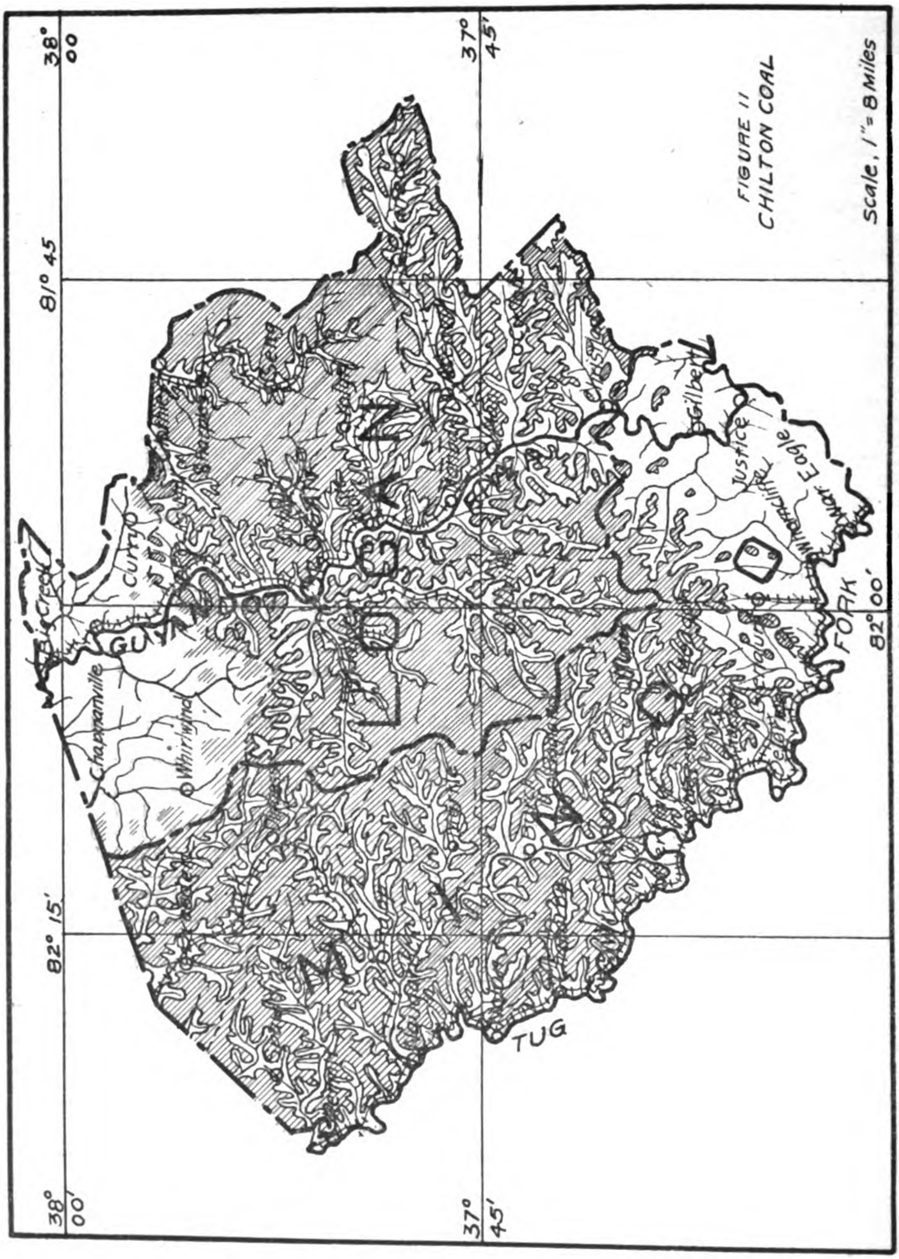

Figure 11. Showing Approximate Minable Area of Chilton Coal. (See explanation in Authors' Preface.)

Chapmanville District, Logan County.

In Chapmanville District, the Chilton Coal is but poorly represented. In Chapter IV, the section for the corner of Logan, Mingo and Lincoln Counties shows 1 foot of slaty coal at this horizon. The coal was not certainly identified elsewhere in the district, although its horizon is nearly everywhere above drainage. With this evidence it seems safe to conclude that the Chilton Coal is not of value in Chapmanville District.

Logan District, Logan County.

In Logan District, the Chilton Coal is known to be commercially pure in the region east of the Guyandot River. West of this river, the coal is not so good, but it was noted frequently as will be seen in the following pages.

In Chapter IV, the coal is noted in the sections for Clothier and Ethel, and in Chapter VI it appears in those for Beech Creek, Hughey, Pine Creek and Stollings.

In the present Chapter, it is reported in the Boone County Coal Corporation's Coal Test No. 6 (No. 53 on Map II), the Boone County Coal Corporation No. 3 (No. 59 on Map II), the Dingess-Rum Coal Co. No. 2 (No. 67 on Map II), and the Wood, Cole and Crane No. 2 (No. 101 on Map II).

The following opening was examined by Hennen:

Milton McNeely Opening—No. 246 on Map II.

On Long Fork of Mill Creek, 2 miles east of Ralumco; Chilton Coal; elevation, 1385′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, dark gray, sandy			0	8
Coal, gas, hard, blocky	1′	6″		
Slate, black, bony, 2″ to	0	4		
Coal, splint	2	9	4	7
Fire clay, pavement				

This coal was once sampled by E. V. d'Invilliers and analyzed by A. S. McCreath for the C. & O. Railway. This analysis, as published in Volume II(A), page 428, of the State Survey Reports, under Sample No. 107L, and classified provisionally as the Winifrede Coal, is as follows:

	Per cent.
Moisture	1.196
Volatile Matter	35.514
Fixed Carbon	57.514
Sulphur	0.696
Ash	5.080
Total	100.000

Another opening, examined by Hennen near the last one, shows the following:

Coal Opening—No. 247 on Map II.

On the head of Hewett Creek, 2.7 miles east of Ralumco; **Chilton Coal**; elevation, 1390′ B.

			Feet	Inches
Sandstone, shaly			5	0
Coal, slaty			0	1
Shale, dark, many fossil trees and plants			6	6
Coal, gas	0′	6″		
Coal, semi-splint	1	2		
Coal, bony	0	3		
Slate, black	0	2		
Coal, gas	0	4		
Coal, splint	2	6	4	11
Pavement				

The following mine is the farthest place northwest where the Chilton Coal is commercially mined in Logan County:

E. R. Johnson Coal Co. Mine—No. 35 on Map II.

On Crooked Creek, at Hughey; **Chilton Coal**; elevation, 1360′ L.

				Feet	Inches
1.	Sandstone, massive, Upper Chilton			20	0
2.	Shale, 0′ 0″ to 5′ 0″			2	0
3.	Coal, gas	0′	4″		
4.	Sulphur streak, 0″ to	0	0½		
5.	Coal, semi-splint	1	2		
6.	Coal, splint	0	1½		
7.	Bone	0	6		
8.	Coal, gas	0	8		
9.	Coal, semi-splint	0	6		
10.	Coal, gas, hard	1	2½	4	6½
11.	Slate				

"Coal owned by McDonald, Henderson and Mitchell Land Co.; principal office, Hughey; daily capacity, 500 tons; daily output, 250 tons; 20 laborers and 30 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 71° W.; faces, N. 19° E.; greatest rise, north; sample collected from Nos. 3, 5, 8, 9 and 10 of section, at face of Main Heading, 100 feet north of 10th Left Heading, by R. M. Gawthrop; No. 6 of section sticks to the bone and is discarded; J. P. Small, Superintendent, authority for data."

The composition of this sample is published under Mine No. 35 in the table at the end of this Chapter.

The following opening was examined by Hennen:

Coal Opening—No. 248 on Map II.

On Righthand Fork of Dingess Run, 0.7 mile east of Foley; Chilton Coal; elevation, 935′ B.

			Feet	Inches
Sandstone, massive, micaceous, medium grained			**10**	**0**
Shale, with fossil plants, 6″ to			**1**	**0**
Coal, gas	**0′**	**7″**		
Coal, gas, harder	**0**	**6**		
Coal, gas	**1**	**2**		
Coal, splinty	**0**	**7**		
Slate, black	**0**	**3**		
Shale, gray	**0**	**2**		
Slate, bony	**0**	**2**		
Shale, gray	**0**	**4**		
Coal, splinty	**1**	**7**	**5**	**4**
Fire clay				

The following opening was examined by Hennen, farther up the same fork:

Coal Opening—No. 249 on Map II.

On Righthand Fork of Dingess Run, 1.6 miles east of Foley; Chilton Coal; elevation, 965′ B.

			Feet.	Inches.
Shale			**1**	**0**
Coal, gas	**0′**	**3″**		
Slate, dark, gray	**0**	**1½**		
Coal	**3**	**0**		
Slate, hard, black	**0**	**3½**		
Shale, dark gray	**0**	**8**		
Bone	**0**	**2**		
Shale, dark gray	**0**	**6**		
Coal, splint	**1**	**1**	**6**	**1**
Fire clay pavement				

The following mine operates the coal commercially:

Sunbeam Coal Co., Sunbeam Mine—No. 36 on Map II.

On Dingess Run, 0.2 mile southwest of Fort Branch; **Chilton Coal**; elevation, 900′ L.

				Feet.	Inches.
1.	Sandstone, massive			10	0
2.	Coal, splint	0′	1½″		
3.	Coal, gas	1	11		
4.	Bone	0	7		
5.	Coal, gray splint	0	2		
6.	Coal, gas	0	5		
7.	Coal, splint	0	1		
8.	Coal, gas	1	1½	4	5
9.	Shale				

"Coal owned by Dingess-Rum Coal Co.; principal office, Logan; daily capacity, 250 tons; daily output, 150 tons; 12 laborers and 12 miners employed; electric haulage; used for steam and domestic purposes; shipped east and west; butts, N. 40° W.; faces, N. 50° E.; greatest rise, N. 15° W.; pocket compass determination; sample collected from Nos. 2, 3, 5, 6, 7 and 8 of section, in Room No. 2 off 2nd Right Heading, by R. M. Gawthrop; Samuel Roebuck, Foreman, authority for data."

The composition of this sample is published under Mine No. 36 in the table at the end of this Chapter.

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 381, of the State Survey Reports. The correlation of the coal is changed here from the **No. 2 Gas** to the **Chilton**:

Fort Branch Coal Co. Mine—No. 37 on Map II.

On Dingess Run, 0.3 mile northeast of Fort Branch; **Chilton Coal**; elevation, 855′ B.

				Feet.	Inches.
1.	Sandstone				
2.	Coal, splint	0′	1″		
3.	Coal, semi-splint	1	10		
4.	Coal, bony splint (rejected)	0	4		
5.	Slate, black	0	4		
6.	Coal, semi-splint	1	11	4	6
7.	Slate			0	4
8.	Sandstone, hard				

"Principal office, Pearisburg, Va.; butts, S. 40° E.; faces, N. 50° E.; greatest rise, N. 40° W.; mine capacity, 100 tons; men employed, 20; coal, run of mine, shipped west for steam and domestic purposes; authority for mine data, F. R. Kitchen, Mine Foreman; sample collected from Nos. 2, 3, and 6 for analysis."

The composition of this sample is published under Mine No. 37 in the table at the end of this Chapter.

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 382, of the State Survey Reports, under the name of the Odd Coal Company. The correlation of the coal is changed in the present report from **No. 2 Gas** to **Chilton:**

Logan Mining Co., Wanda Mine—No. 38 on Map II.

On Dingess Run, at Wanda; **Chilton Coal**; elevation, 905′ B.

				Feet	Inches
1.	Sandstone				
2.	Coal, semi-splint	2′	4″		
3.	Slate, black, hard	0	5		
4.	Coal, semi-splint	0	9		
5	Coal, gray splint, hard	0	1		
6.	Coal, semi-splint	1	3	4	10
7.	Slate				

"Butts, S. 50° E.; faces N. 40° E.; greatest rise, N. 45° W.; mine capacity, 150 tons; men employed, 13; coal shipped west for steam and general fuel purposes; sample collected from Nos. 2, 4, 5 and 6 for analysis."

The composition of this sample is published under Mine No. 38 in the table at the end of this Chapter.

The following mine is another that was examined and sampled by Hennen. The results were published in Volume II(A), page 382, of the State Survey Reports. The correlation of the coal is changed from the **No. 2 Gas** to the **Chilton** in the present report:

Rex Coal & Coke Co., Rex Mine—No. 39 on Map II.

On Dingess Run, 0.2 mile southwest of Ethel; **Chilton Coal**; elevation 905′ B.

				Feet	Inches
1.	Slate				
2.	Coal, semi-splint (given by mine boss; not seen by Mr. Hennen) Alma? (Chilton "A")			4	0
3.	Sandstone, (Upper Chilton)			70	0
4.	Slate, 0″ to			1	6
5.	Coal, semi-splint	2′	0″		
6.	Coal, splint	0	5		
7.	Coal, gas, soft	0	3		
8.	Slate, black, hard	0	4		
9.	Coal, splint	0	6		
10.	Coal, semi-splint	1	8	5	2
11.	Slate				

"Butts, S. 50° E.; faces, N. 40° E.; greatest rise, N. 45° W ; mine capacity, 150 tons; men employed, 25; coal shipped west for steam and domestic purposes; sample collected from Nos. 5, 6, 7, 9 and 10 for analysis."

The composition of the sample is published under Mine No. 39 in the table at the end of this Chapter.

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 381, of the State Survey Reports, the coal being provisionally classified as the **No. 2 Gas,** while it should be the **Chilton:**

Logan Coal Co., Logan Mine—No. 40 on Map II.

On Dingess Run, 0.3 mile west of Ethel; **Chilton Coal**; elevation, 910′ B.

				Feet	Inches
1.	Sandstone				
2.	Slate, 4″ to			0	5
3.	Coal, splint	0′	3″		
4.	Coal, semi-splint, hard	1	8½		
5.	Coal, splint	0	6		
6.	Slate, black, hard	0	5		
7.	Coal, semi-splint	0	9		
8.	Coal, splint, hard	0	1		
9.	Coal, semi-splint	1	1	4	9½
10.	Slate				

"Principal office, Roanoke, Va.; butts, S. 50° E.; faces, N. 40° E.; greatest rise, N. 45° W.; mine capacity, 300 tons; men employed, 22; coal shipped west for domestic purposes; authority for mine data, R. S. Baldwin, Superintendent; sample collected from Nos. 3, 4, 5, 7, 8 and 9 for analysis."

The composition of the sample is published under Mine No. 40 in the table at the end of this Chapter.

The following mine is in the same region:

Logan Mining Co., Manitoba Mine—No. 41 on Map II.

On Left Fork of Dingess Run, 0.4 mile N. 45° E. of Ethel; **Chilton Coal**; elevation, 899′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, splint	0′	2″		
3.	Coal, semi-splint	0	4		
4.	Coal, gas, hard	1	11		
5.	Coal, gray, splint	0	4		
6.	Coal, semi-splint	0	3		
7.	Bone	0	3		
8.	Coal, semi-splint	0	8		
9.	Bone	0	2		
10.	Coal, gas	0	5		
11.	Fire clay, 0″ to	0	1		
12.	Coal, semi-splint	0	9	5	4
13.	Shale				

"Coal owned by Dingess-Rum Coal Co.; principal office, Fairmont; daily capacity, 700 tons; daily output, 600 tons; 22 laborers and 33 miners employed; mule and electric haulage; used for steam, domestic and furnace fuel; shipped west; butts, N. 45° W.; faces, N. 45° E.; greatest rise, S. 45° E.; sample No. 43G collected from Nos. 2, 3. 4, 5, 6, 8, 10 and 12 of section, in Room No 2 off 2nd "C" Butt Heading, by R. M. Gawthrop; sample No. 43Ga collected from Nos. 2, 3, 4, 5 and 6; and sample No. 43Gb collected from Nos. 8, 10 and 12 of section; O. J. Jenkins, Foreman, authority."

The composition of the three samples, one from the entire mining section, one from the upper and one from the lower bench, are published under Mine No. 41 in the table at the end this Chapter.

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 381, of the State Survey Reports. As in other mines in this region, the coal was correlated as the **No. 2 Gas,** but it proves to be the **Chilton:**

Ethel Coal Co., Ethel Mine—No. 42 on Map II.

On Dingess Run, 0.5 mile northeast of Ethel; **Chilton Coal**; elevation, 920′ B.

				Feet	Inches
1.	Slate				
2.	Coal, splint	0′	6″		
3.	Coal, semi-splint. hard ...	2	3		
4.	Slate, black, hard	0	3		
5.	Coal, semi-splint	0	9		
6.	Slate, black	0	0½		
7.	Coal, splint	1	3	5	0½
8.	Slate				

"Principal office, Bramwell; butts, S. 40° E.; faces, N. .50° E.; greatest rise, N. 40° W.; mine capacity, 125 tons; men employed, 30; coal shipped mostly west for steam and domestic purposes; authority for mine data, Henry Hall, Mine Foreman; sample collected from Nos. 3, 5 and 7, for analysis."

The composition of the sample is published under Mine No. 42 in the table at the end of this Chapter.

The following opening was examined by Hennen in the same region:

Coal Opening—No. 250 on Map II.

On Camp Branch of Dingess Run, 0.6 mile east of Ethel; **Chilton Coal**; elevation, 915′ B.

	Feet	Inches
Sandstone, shaly	5	0
Shale, sandy, dark, with fossil trees	7	0

			Feet	Inches
Coal, semi-splint	3′	0″		
Bone, conchoidal fracture	0	3		
Coal, semi-splint	0	9		
Shale, dark gray	0	7		
Coal, gas, hard	0	10	5	5
Concealed by water				

The following opening was examined by Hennen:

Coal Opening—No. 251 on Map II.

On Freeze Fork of Dingess Run, 1.1 miles southeast of Ethel; **Chilton Coal**; elevation, 925′ B.

			Feet	Inches
Shale, sandy			10	0
Coal, gas	0′	10″		
Coal, splint	1	3		
Coal, splint, harder	0	11		
Slate, black, conchoidal fracture	0	4		
Coal, splint	0	7		
Slate, bony	0	2	4	1
Concealed				

The following is another mine in the same region:

Freeze Fork Coal Co. Mine—No. 43 on Map II.

On Dingess Run, 1.3 miles S. 60° E. of Ethel; **Chilton Coal**; elevation, 930′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, splint	0′	5″		
3.	Coal, gas	1	9		
4.	Coal, semi-splint	0	6		
5.	Coal, splint	0	5		
6.	Bone	0	3		
7.	Coal, splint	0	7		
8.	Shale, reported	0	3		
9.	Coal, reported	0	11	5	1

"Coal owned by Dingess-Rum Coal Co.; principal office, No. 510 Ford Bldg., Detroit, Mich.; daily capacity, 150 tons; daily output, 75 tons; 6 laborers and 12 miners employed; mule haulage; used for steam; shipped east and west, mostly west; butts, N. 45° W.; faces, No. 45° E.; greatest rise, S. 40° E.; sample collected from Nos. 2, 3, 4, 5, and 7 of section at face of No. 3 East Entry off Main South Entry, by R. M. Gawthrop; A. Shimman, Superintendent, authority for data."

The composition of this sample is published under Mine No. 43 in the table at the end of this Chapter.

The following mine is farther up the same stream:

Georges Creek Coal Co. Mine—No. 44 on Map II.

On Rockhouse Fork of Dingess Run, 2.1 miles S. 75° E. of Ethel; **Chilton Coal**; elevation, 1030′ B.

				Feet	Inches
1.	Shale				
2.	Coal, gas 1′ 2″ to	0′	3″		
3.	Fire clay shale, 3′ 0″ to	0	6		
4.	Coal, splint	1	1		
5.	Coal, gas	1	5		
6.	Shale, holding coal streak, 0′ 0″ to 0′ 6″	0	1¾		
7.	Coal, gas	1	10½		
8.	Sulphur, 0′ 0″ to	0	1		
9.	Coal, gas	0	10		
10.	Coal, splint	0	3		
11.	Coal, gas	0	2	6	7¼
12.	Slate				

"Coal owned by Dingess-Rum Coal Co.; principal office, Cumberland, Md ; daily capacity, 250 tons; daily output, 100 tons; 22 laborers and 15 miners employed; horse haulage; used for steam; shipped west; butts, N. 45° W.; faces, N. 45° E.; greatest rise, S. 45° E ; sample 41G collected from Nos. 4, 5, 7, 9. 10 and 11 of section, at face of 3rd Right Heading, 300 feet from Main Heading, by R. M. Gawthrop; sample 41Ga collected from Nos. 4 and 5; and sample 41Gb collected from Nos. 7, 9, 10 and 11 of section; Robert Gunning, Superintendent, authority for data."

The compositions of these three samples, from the total mining section, and from the top and bottom benches, respectively, are published under Mine No. 44 in the table at the end of this Chapter.

The following opening was examed by Hennen on Rum Creek:

Coal Opening—No. 252 on Map II.

On Rum Creek, 1.2 miles southwest of Yolyn; **Chilton Coal**; elevation, 1140′ B.

			Feet	Inches
Shale, sandy			4	0
Coal, gas, hard	0′	8″		
Shale, gray	0	2		
Coal	2	8½		
Bone	0	4		
Coal	0	0½	3	11
Fire clay			0	6
Concealed				

At the following mine the coal is operated commercially:

Argyle Coal Co. Mine—No. 45 on Map II.

On Rum Creek, 0.5 mile west of Yolyn; **Chilton Coal**; elevation, 1128′ L.

				Feet	Inches
1.	Sandstone, massive				
2.	Fire clay shale, 0″ to			1	6
3.	Coal, semi-splint	0′	6″		
4.	Coal, gas	0	11		
5.	Bone	0	1		
6.	Coal, gas	0	2		
7.	Bone	0	2½		
8.	Coal, splinty	0	8		
9.	Coal, semi-splint	0	11		
10.	Coal, splint	0	2½		
11.	Coal, gas, soft	0	6		
12.	Coal, gas, hard	1	6		
13.	Coal, splint	0	4		
14.	Coal, gas, hard	0	6	6	6
15.	Slate				

"Coal owned by Dingess-Rum Coal Co ; principal office, Oak Hill; designed for daily capacity of 800 tons; daily output, 80 tons; mine has been in operation only a short tine; 7 laborers and 13 miners employed; mule haulage; used for domestic fuel; shipped east and west; butts and faces, irregular; greatest rise, southeast; sample collected from Nos. 3, 4, 6, 8, 9, 10, 11, 12, 13 and 14 of section. at working face of Straight Heading Air Course, about 200 feet from opening, by R. M. Gawthrop; W. T. Harvey, Superintendent, authority for data."

The composition of the sample is published under Mine No. 45 in the table at the end of this Chapter.

The following mine operates the coal along the same creek:

Paragon Colliery Co. Mine—No. 46 on Map II.

On Rum Creek, at Yolyn; **Chilton Coal**; elevation, 1153′ L.

				Feet	Inches
1.	Sandstone, flaggy				
2.	Fire clay, shale, 1′ 0″ to			1	6
3.	Coal, gas, hard	1′	0″		
4.	Bone	0	2		
5.	Coal, gas	0	1½		
6.	Bone	0	4		
7.	Coal, semi-splint	0	10		
8.	Coal, gas	2	1		
9.	Coal, gas, hard	0	10		
10.	Coal, semi-splint	0	2	5	6½
11.	Slate				

"Coal owned by Dingess-Rum Coal Co ; principal office, Yolyn; daily capacity, 350 tons; daily output, 250 tons; 15 laborers and 25 miners employed; mule haulage; used for steam and domestic fuel; shipped east and west; butts and faces, irregular; greatest rise, southeast; sample collected from Nos. 3, 5, 7, 8, 9 and 10 of section, at face of Main Heading, opposite 4th Right Heading. by R. M. Gawthrop; E. C James, Superintendent, authority for data."

The composition of this sample is published under Mine No. 46 in the table at the end of this Chapter.

The **Cub Fork Coal Company (Mine—No. 253 on Map II),** located just above Cub Branch of Rum Creek, 0.5 mile southeast of Yolyn, was preparing to open a mine in the Chilton Coal, but the section was not available. The coal here has a tidal elevation of 1166′ L.

The following is another mine that operates the coal along the same creek:

McGregor Coal Co. No. 1 Mine—No. 47 on Map II.

On Rum Creek, at Slagle; Chilton Coal; elevation, 1242′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, reported			0	4
3.	Fire clay, shale			1	6
4.	Coal, semi-splint	0′	2″		
5.	Coal, gas	1	3		
6.	Bone	0	0½		
7.	Coal, gas	0	3½		
8.	Bone	0	0½		
9.	Coal, semi-splint	0	6		
10.	Shale	0	4		
11.	Coal, semi-splint	0	9		
12.	Coal, gas	1	10		
13.	Sulphur, 0″ to	0	1		
14.	Coal, gas	1	1		
15.	Shale, 1′ 0″ to	0	1		
16.	Coal, gas	0	8	7	1½
17.	Shale				

"Coal owned by Dingess-Rum Coal Co.; principal office, Charleston; daily capacity, 2,000 tons; daily output, 600 tons; 25 laborers and 40 miners employed; mule haulage; used for steam, domestic fuel and for gas ovens by Edison Illuminating Co., of Detroit, Mich.; shipped west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 4, 5, 7, 9, 11, 12, 14 and 16 of section in Main Entry, 500 feet above 1st Right Heading, by R. M. Gawthrop; G. L. Bailey, Superintendent, authority for data."

The composition of this sample is given under Mine No. 47 in the table at the end of this Chapter:

The Chilton Coal is a valuable seam along the waters of Little Coal River in the northeastern part of Logan District. Numerous prospects and mines were visited by members of the Survey, nearly all of which showed excellent coal.

The following opening, examined by Hennen, shows a local split in the coal:

Coal Opening—No. 254 on Map II.

On Garland Fork of Spruce Fork, 1.8 miles southeast of Sovereign; Chilton Coal; elevation, 1121' L.

			Feet	Inches
Concealed and shale				
Coal, gas	3'	2"		
Shale, buff	2	6		
Sandstone, shaly	2	0		
Shale, gray, sandy	3	6		
Coal, gas, hard	3	2	14	4
Slate, gray, pavement, and concealed				

Another opening, visited by Hennen, along the same stream, shows the following:

Coal Opening—No. 255 on Map II.

On Garland Fork of Spruce Fork, 1.2 miles southeast of Sovereign; Chilton Coal; elevation, 1180' B.

			Feet	Inches
Shale, dark, sandy				
Coal	0'	4"		
Shale, gray	1	2		
Coal, gas	0	5		
Fire clay shale 1" to	0	2		
Coal, gas	2	6		
Shale, gray, 1" to	0	2		
Coal	0	8	5	5
Slate, dark, pavement			0	6

The following opening, examined by Hennen, on the next fork, shows the following:

Coal Opening—No. 256 on Map II.

On Brushy Fork of Spruce Fork, 2.7 miles southeast of Sovereign; Chilton Coal; elevation, 1315' B.

			Feet	Inches
Sandstone, massive, broken			30	0
Coal	0'	1"		
Shale, sandy	0	6		
Coal	0	10		
Bony splint	0	1		
Coal	1	0	2	6
Shale, sandy, to road fork			1	0

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 257 on Map II.

On Spruce Fork, 0.9 mile southeast of Sovereign; **Chilton Coal**; elevation, 1140′ B.

	Feet	Inches
Sandstone, massive	3	0
Shale, sandy	1	3
Coal, gas, hard	3	2
Fire clay, pavement, and concealed		

The following opening was examined by Hennen near Seng:

Coal Opening—No. 258 on Map II.

On Spruce Fork, 0.3 mile southeast of Seng; **Chilton Coal**; elevation, 1025′ B.

			Feet	Inches
Shale, sandy			4	0
Sandstone, shaly			3	0
Shale, sandy			4	0
Coal	0′	1″		
Fire clay shale	3	6		
Coal, bony	0	2		
Coal, splinty	3	0		
Shale, gray	0	5		
Cannel coal	0	7		
Coal, gas	0	2		
Fire clay shale	3	0		
Coal	2	9	13	8
Slate, dark gray, very hard, with conchoidal fracture				

The following is one of the commercial mines operating the Chilton Coal:

Sovereign Coal Co. Mine—No. 48 on Map II.

On Atkins Fork of Spruce Fork, 0.5 mile southwest of Sovereign; **Chilton Coal**; elevation, 1105′ B.

				Feet	Inches
1.	Shale, gray				
2.	Fire clay shale, 1′ 0″ to			3	0
3.	Coal	1′	6″		
4.	Coal, gas	1	2		
5.	Coal, cannel	0	10		
6.	Shale, gray, 6″ to	1	0		
7.	Coal, gas, hard	0	8		
8.	Coal, gas, soft	2	8		
9.	Coal, semi-splint	0	6		
10.	Coal, gas	0	2	8	6
11.	Fire clay shale				

"Coal owned by Boone County Coal Corporation; principal office, Lynchburg, Va.; daily capacity, 250 tons; daily output, 200 tons; 7 laborers and 18 miners employed; mule haulage; used for steam; shipped east and west; butts, N. 60° W.; faces, N. 30° E.; greatest rise, S. 40° E.; pocket compass determination; sample No. 76G collected from Nos. 4, 5, 7, 8, 9 and 10, and sample No. 76Ga from No. 5 of section, at face of Main Heading, 160 feet above 1st Right Heading, by R. M. Gawthrop; J. C. Finimore, General Manager, authority for data."

The analyses of the two samples are published under Mine No. 48 in the table at the end of this Chapter. No. 3 of section is left up for the roof, and the cannel coal, No. 5 of section, is shipped with the other coal.

The following is another commercial mine in the same region:

D. C. Thomas Coal Co., Grace Mine—No. 49 on Map II.

On Spruce Fork, 0.2 mile southeast of Seng; **Chilton Coal**; elevation, 1028′ B.

				Feet	Inches
1.	Shale, gray				
2.	Fire clay shale, 1′ 0″ to			2	0
3.	Coal, gas	0′	3″		
4.	Coal, splinty	0	4		
5.	Coal, gas, hard	0	5		
6.	Coal, gas	1	6		
7.	Coal, gas, harder	0	8		
8.	Sulphur band, 0″ to	0	0¼		
9.	Coal, gas, hard	1	1¾		
10.	Coal, gas, softer	1	8		
11.	Coal, semi-splint	0	5½		
12.	Shale	0	0½		
13.	Coal, gas	0	2	6	8
14.	Fire clay shale				

"Coal owned by Boone County Coal Corporation; principal office, No. 8 East Broad St., Columbus, Ohio; daily capacity 500 tons; daily output 400 tons; 27 laborers and 23 miners employed; mule haulage; used for steam and domestic fuel; shipped east and west; butts, N. 60° W.; faces, N. 30° E.; greatest rise, S. 40° E.; pocket compass determination; sample No. 74G collected from Nos. 6, 7, 9, 10, 11, 12 and 13; sample No. 74Ga from Nos. 3, 4, 5, 6 and 7; and sample No. 74Gb from Nos. 9, 10, 11, 12 and 13 of section, at face of Main Air Course, 200 feet above 4th East Heading, by R. M. Gawthrop; J. O. Trumbo, Clerk, authority for data. Nos. 3, 4 and 5 of section are left up for the roof."

The analyses of the three samples, one from the entire mining section, one from the portion above and one from below the sulphur band, are given under Mine No. 49 in the table at the end of this Chapter.

The following mine is located in the same region:

Upperman Coal Co. Mine—No. 50 on Map II.

On Whites Trace Branch. 0.3 mile southwest of Seng; **Chilton Coal**; elevation, 1025′ B.

				Feet	Inches
1.	Shale, gray				
2.	Fire clay shale, 1′ 0″ to			2	0
3.	Coal, gas	0′	2″		
4.	Coal, semi-splint	0	6		
5.	Coal, gas	2	8		
6.	Shale, gray, 3″ to	0	6		
7.	Coal, cannel	0	6		
8.	Coal, gas	0	2		
9.	Coal, splinty	0	1		
10.	Coal, gas	1	7		
11.	Coal, semi-splint	0	5½		
12.	Shale	0	0½		
13.	Coal, gas	0	2	6	10
14.	Fire clay shale				

"Coal owned by Boone County Coal Corporation; principal office, Seng; daily capacity, 300 tons; daily output, 250 tons; 9 laborers and 20 miners employed; used for steam and domestic fuel; shipped east and west; butts, N. 60° W.; faces, N. 30° E.; greatest rise, southeast; sample collected from Nos. 3, 4, 5, 7, 8, 9, 10, 11 and 13 of section at face of No. 1 Straight Heading, 300 feet above 1st Right Heading, by R. M. Gawthrop; William Warner, Foreman, authority for data."

The composition of the sample is given under Mine No. 50 in the table at the end of this Chapter.

The following mine is near the last two reported:

Spruce Valley Coal Co. Mine—No. 51 on Map II.

On Oldhouse Branch, 0.4 mile east of Seng; **Chilton Coal**; elevation, 1034′ L.

				Feet	Inches
1.	Shale				
2.	Fire clay shale, 1′ 0″ to			2	6
3.	Coal, hard	1′	3″		
4.	Coal, gas	1	9		
5.	Coal, semi-splint	0	2		
6.	Coal, gas	0	8		
7.	Shale, gray, 0″ to	0	1		
8.	Coal, gas, hard	0	8		
9.	Coal, gas, soft	1	5		
10.	Coal, semi-splint	0	5½		
11.	Shale	0	0½		
12.	Coal, gas	0	2	6	8
13.	Fire clay shale				

"Coal owned by Boone County Coal Corporation; principal office, Seng; daily capacity, 100 tons; daily output, 50 tons; mine has been working only 30 days; used for steam and domestic fuel; shipped west; 6 laborers and 5 miners employed; electric haulage; butts, N. 60° W.; faces, N. 30° E.; greatest rise, S. 40°E., pocket compass determinations; sample collected from Nos. 4, 5, 6, 8, 9, and 10 of section, at face of Main Entry, 100 feet above 2nd Left Entry, by R. M. Gawthrop; John Wills, Superintendent, authority for data. No. 3 of section is left up for roof and No. 12 is not mined."

The composition of this sample is published under Mine No. 51 in the table at the end of this Chapter.

The following opening was examined by Hennen farther down Spruce Fork:

Coal Opening—No. 259 on Map II.

On Spruce Fork, 1.6 miles northeast of Seng; **Chilton Coal**; elevation, 1030′ B.

			Feet	Inches
Shale, sandy				
Coal, slaty	0′	3″		
Shale, sandy	1	3		
Coal	0	3		
Shale, gray	3	6		
Coal	0	1½		
Shale, dark gray	2	2		
Coal	0	1½		
Shale, dark gray	3	0		
Coal, good	3	7	14	3
Slate and concealed				

The following opening was examined by Hennen on a branch of Spruce Fork:

Coal Opening—No. 260 on Map II.

On Seng Camp Creek, 2.7 miles southeast of Sharples; **Chilton Coal**; elevation, 1040′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	2″		
Concealed, with coal	3	0		
Shale, dark	2	0		
Coal	0	2½		
Shale	0	0½		
Coal	0	1		
Shale	1	0		
Coal	0	1		
Shale	0	5		
Coal	0	1½		
Shale	0	2		
Coal	0	0½		
Fire clay shale, gray	3	0		
Shale, dark	2	6		
Coal	1	3		
Bone	0	1		
Coal	1	6	15	8
Concealed				

Another opening examined by Hennen along the same creek shows the following:

Coal Opening—No. 261 on Map II.

On Seng Camp Creek, 3 miles southeast of Sharples; Chilton Coal; elevation, 1100' B.

			Feet	Inches
Sandstone, massive, brown, micaceous			15	0
Coal	0'	3"		
Shale, gray	2	0		
Coal, splint, bony	1	0		
Shale, dark	7	0		
Sandstone, massive	3	0		
Slate, 0" to	0	3		
Coal, gas, hard	1	10	15	4
Sandstone, bluish gray, to bed of run			2	0

The following prospect was examined by Gawthrop on another branch of the same creek:

Jarrold Heirs Prospect—No. 262 on Map II.

On Seng Creek, 2.8 miles southeast of Sharples; Chilton Coal; elevation, 1065' B.

	Feet	Inches
Sandstone, massive, visible	4	0
Shale, sandy, with plant fossils	2	0
Slate	0	1½
Coal, medium hard	2	0
Shale		

The following exposure was examined by Hennen farther down Spruce Fork along the C. & O. Railway grade:

C. & O. Railway Coal Exposure—No. 263 on Map II.

On Spruce Fork, 0.9 mile east of Sharples; Chilton Coal; elevation, 885' B.

			Feet	Inches
Shale				
Coal	4'	6"		
Shale, gray, 2" to	6	0		
Coal	1	7		
Shale, gray	3	0		
Sandstone, bluish	4	0		
Fire clay, shale	2	0		
Coal	0	11	22	0
Sandstone, to railroad grade			3	0

Another opening, examined by Hennen in the same region, shows the following:

Coal Opening—No. 264 on Map II.

On Spruce Fork, 0.5 mile east of Sharples; Chilton Coal; elevation 868' L.

			Feet	Inches
Shale, sandy			5	0
Coal	0'	1"		
Shale, sandy	2	4		
Coal	0	1		
Fire clay shale	1	6		
Coal, splint, with gas layers	4	5		
Slate, black	0	1		
Coal, splint	0	10	9	4
Slate				

The Chilton Coal is operated commercially at Sharples, where the following mine was examined:

Spruce Bend Coal Co., Sharples Mine—No. 52 on Map II.

On Spruce Fork, at Sharples; Chilton Coal; elevation, 870' B.

				Feet	Inches
1.	Shale				
2.	Coal			0	2½
3.	Fire clay shale, 1' 0" to			2	0
4.	Coal, semi-splint	0'	5½"		
5.	Coal, gas	0	8		
6.	Coal, semi-splint	0	9		
7.	Coal, gas	1	6		
8.	Slate, 0" to	0	0½		
9.	Coal, splinty	0	4		
10.	Coal, gas, hard	0	9	4	6
11.	Slate				

"Coal owned by Boone County Coal Corporation; principal office, Westchester, Pa.; daily capacity, 650 tons; daily output, 550 tons; 18 laborers and 45 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 50° W.; faces, N. 40° E.; greatest rise, S. 40° E.; pocket compass determinations; sample collected from Nos. 4, 5, 6, 7, 9, and 10 of section, in No. 1 Main Right Heading, 150 feet above 4th Left Heading, by R. M. Gawthrop; W. B. Parks, Foreman, authority for data."

The composition of this sample is published under Mine No. 52 in the table at the end of this Chapter.

The following opening was examined by Hennen along Beech Creek, which empties into Spruce Fork at Sharples:

Coal Prospect—No. 265 on Map II.

On Beech Creek, 0.4 mile southwest of Sharples; **Chilton Coal**; elevation, 870′ B.

			Feet	Inches
Sandstone, with shale layers			15	0
Shale			2	6
Coal	0′	2″		
Fire clay shale	1	0		
Coal	4	0	5	2
Concealed				

The following opening was examined by Hennen farther up Beech Creek:

Coal Opening—No. 266 on Map II.

On Beech Creek, 1 mile southwest of Sharples; **Chilton Coal**; elevation, 880′ B.

			Feet	Inches
Shale, sandy			15	0
Coal	0′	1½″		
Fire clay shale	1	0		
Coal	4	7	5	8½
Slate				

The following commercial mine is located just above the electric plant of the Spruce Fork Power Co. at Dobra. Coal from this mine is used to develop power at this plant for mining purposes along Spruce Fork, as described in Chapter I:

Coal River Coal & Coke Co., Dobra Mine—No. 53 on Map II.

On Spruce Fork, at Dobra; **Chilton Coal**; elevation, 848′ L.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal			0	1½
3.	Fire clay shale, 1′ 0″ to			2	0
4.	Coal, bony	0″	2″		
5.	Coal, gas	0	7		
6.	Coal, splint	0	6		
7.	Coal, gas	0	6		
8.	Coal, splint	0	4		
9.	Shale, 0″ to	0	0½		
10.	Coal, gas, hard	1	0		
11.	Coal, gas, soft	1	0		
12.	Coal, semi-splint	0	4		
13.	Coal, gas	0	10	5	3½
14.	Shale				

"Coal owned by Boone County Coal Corporation; principal office, Holden; daily capacity, 600 tons; daily output, 400 tons; 15 laborers and 26 miners employed; electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 50° W.; faces, N 40° E., by pocket compass; greatest rise, northwest; sample collected from Nos. 5, 6, 7, 8, 10, 11, 12, and 13 of section, in Room No. 2 off 4th Right Heading, by R. M. Gawthrop; G. W. Lax, Foreman, authority for data."

The composition of this sample is given under Mine No. 53 in the table at the end of this Chapter.

A sample from the gas coal, No. 13 of section, was collected by Mr. Heiner, Superintendent of the Company. The analysis of this sample, as reported by Mr. Krak, Assistant Chemist, is as follows:

	Per cent.
Moisture	0.97
Volatile Matter	40.96
Fixed Carbon	55.68
Ash	2.39
Total	100.00
Sulphur	0.71
Phosphorus	0.006

The following information was secured at another commercial mine in the same region:

Mifflin Coal Co., Mine No. 1—No. 54 on Map II.

On Rockhouse Creek, 1 mile southwest of Clothier; Chilton Coal; elevation, 908′ L.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal			0	1½
3.	Fire clay shale, 1′ 0″ to			2	0
4.	Coal, bony	0′	2″		
5.	Coal, gas	0	5		
6.	Coal, semi-splint	1	0		
7.	Coal, gas, hard	1	2		
8.	Coal, gas, softer	1	6		
9.	Coal, splinty	0	4		
10.	Coal, gas, hard	1	2	5	9
11.	Slate				

"Coal owned by Boone County Coal Corporation; principal office, Pittsburgh, Pa.; daily capacity, 700 tons; daily output, 500 tons; 20 laborers and 45 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 35° W.; faces N. 55° E.; pocket compass determination; greatest rise, N. 30° W.; sample collected from Nos. 5, 6, 7, 8, 9, and 10 of section, at face of No. 2 Butt Heading, off No. 2 Main Heading, 30 feet above Room No. 8, by R. M. Gawthrop; M. N. Long, Superintendent, authority for data."

The composition of this sample is published under Mine No. 54 in the table at the end of this Chapter.

Another commercial mine examined near the Boone County Line gave the following results:

Coal Valley Mining Co., Sylvia Mine—No. 55 on Map II.

On Spruce Fork, 0.5 mile south of Clothier; **Chilton Coal**; elevation, 849′ L.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal			0	1½
3.	Fire clay shale, 1′ 0″ to			2	6
4.	Coal, bony	0′	2″		
5.	Coal, gas	0	7		
6.	Coal, semi-splint	0	4		
7.	Coal, gas	0	6		
8.	Coal, semi-splint	0	3		
9.	Shale	0	1		
10.	Coal, gas	1	11		
11.	Fire clay	0	1		
12.	Coal, splinty	0	4		
13.	Coal, gas	1	0	5	3
14.	Shale				

"Coal owned by Boone County Coal Corporation; principal office, Clothier; daily capacity, 700 tons; daily output, 500 tons; 18 laborers and 36 miners employed; electric haulage; used for steam and domestic purposes; shipped east and west; butts, N. 40° W.; faces, N. 50° E.; greatest rise, S. 40° E., pocket compass determinations; sample collected from Nos. 5, 6, 7, 8, 10, 12 and 13 of section in Room No. 4 off 1st Right Heading by R. M. Gawthrop; L. T. Vermillion, Superintendent authority for data. Mine not in operation on date visited. Sample taken from old working place; surface cleared but coal probably somewhat oxidized."

The composition of this sample is published under Mine No. 55 in the table at the end of this Chapter.

The following opening was examined by Hennen in the same region:

Coal Opening—No. 267 on Map II.

At the mouth of Bend Branch of Spruce Fork, 0.5 mile south of Clothier; **Chilton Coal**; elevation, 858′ H. L.

			Feet	Inches
Shale, sandy			2	0
Coal	2′	1″		
Shale, gray	1	3		
Coal	0	2		
Shale	0	0¾		
Coal	0	5		
Shale, gray	0	11		
Coal	0	1		
Shale, gray	0	9		
Coal	0	1		
Shale, gray	1	2		
Coal	0	1		
Shale, gray	3	0		
Coal, main bench, or mining ply	4	0	14	0¾

In the western and southern parts of Logan District, the evidence regarding the Chilton Coal is meager, but the lack of abundant prospects and the unsatisfactory sections at those observed indicate that the coal is probably of much less value than in the region east of the Guyandot River.

The following exposure of what appears to be the Chilton Coal was examined by Reger in the western part of the district:

Coal Prospect—No. 268 on Map II.

On Trace Fork of Copperas Mine Fork, 2.1 miles southwest of Holden; **Chilton Coal**; elevation, 1010′ B.

			Feet	Inches
Sandstone, massive			30	0
Coal	1′	2″		
Slate, black	1	0		
Coal	0	2	2	4
Shale, gray, with nodules of iron carbonate....				

The following exposure of the same coal was examined by Reger in the highway at the head of the same fork:

Coal Exposure—No. 269 on Map II.

At the head of Trace Fork of Copperas Mine Fork, 2.7 miles southwest of Holden; **Chilton Coal**; elevation, 1061′ H. L.

			Feet	Inches
Coal	0′	4″		
Slate, gray	1	6		
Coal	1	6	3	4
Shale, gray				

The exposed coal was so badly weathered that it was impossible to determine its quality.

An outcrop of the Chilton Coal, one foot thick, was observed by Reger on Whitman Creek, near the U. S. Coal & Oil Co. Coal Test No. 2 (No. 94 on Map II), 2.5 miles southward from Holden, where it is 960 feet above sea level, by aneroid, and its blossom was noted by Reger also at the forks of Left Fork of Whitman Creek, 0.3 mile east of the U. S. Coal & Oil Co. Coal Test No. 4 (No. 96 on Map II), and 3.3 miles south-

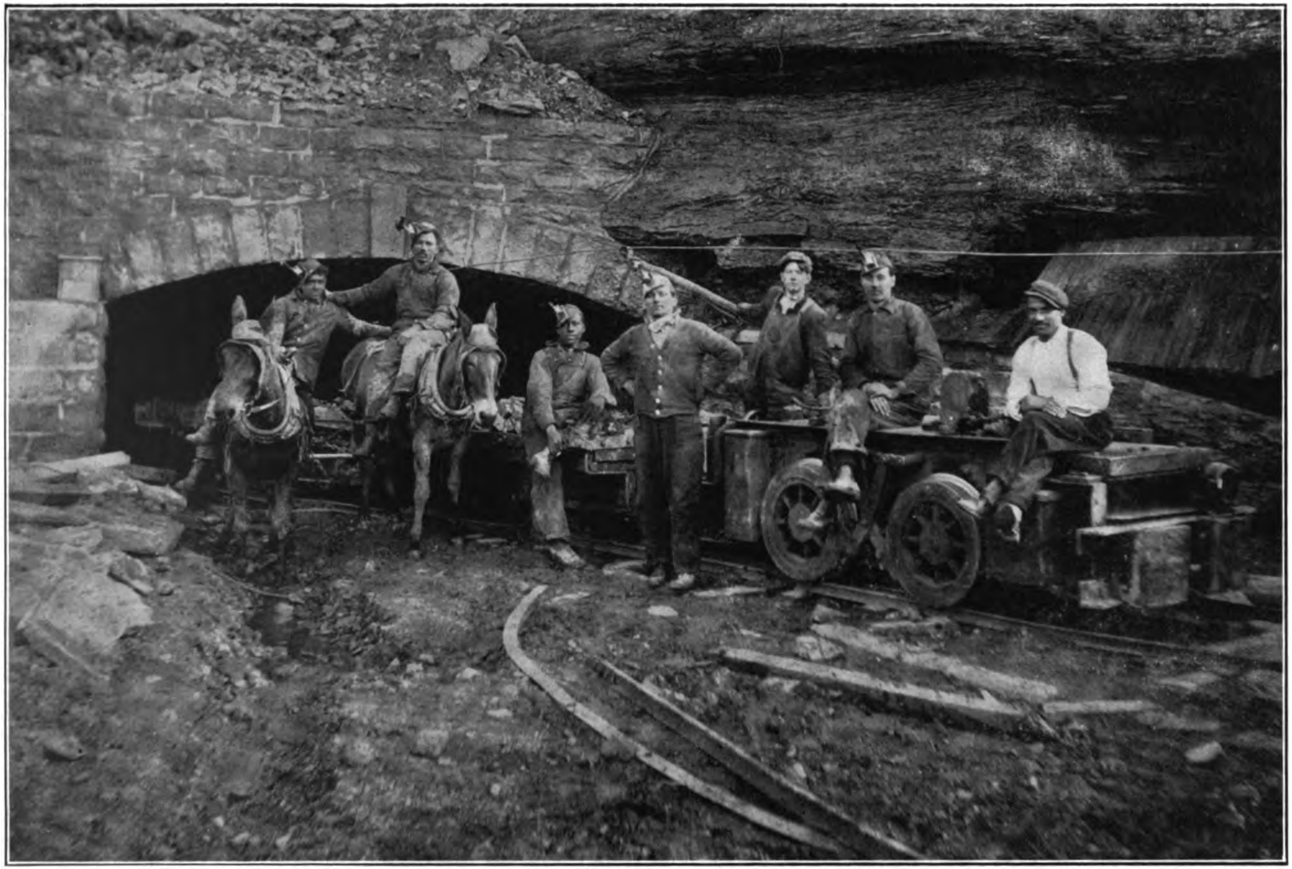

PLATE X.—Mine entrance to Chilton Coal at Mine 52 on Map II—Spruce Bend Coal Company—near Sharples on Spruce Fork.

east of Holden, where it is 985 feet above sea level, by aneroid.

On Island Creek, its blossom was found by Reger in a slip west of the creek, and 0.6 mile northwest of the mouth of Miller Branch, its tidal elevation being 1140′ B.

On Pine Creek, a coal crop 1′ 2″ thick was observed by Reger in the hollow south of Wood, Cole & Crane Coal Test No. 4 (No. 98 on Map II), coming 1070′ B. It may be the Chilton, which is sometimes split into two or three benches in this region, as shown by the Laurel Fork of Pine Creek Section in Chapter VI.

Another exposure that seems to represent the Chilton was observed by Reger farther up Pine Creek, as follows:

Coal Exposure—No. 270 on Map II.

On Right Fork of Pine Creek, 3.2 miles northwest of Oilville; Chilton Coal; elevation, 1065′ B.

			Feet	Inches
Sandstone, massive				
Coal			0	2
Shale, gray			4	0
Coal	0′	2″		
Shale	0	4		
Coal	1	9	2	3
Shale, gray, and concealed, to creek				

On the head of Island Creek, Hennen observed the following exposure of the Chilton Coal:

Coal Opening—No. 271 on Map II.

On Island Creek, 1.1 miles northeast of Calico; Chilton Coal; elevation, 1525′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, flaggy			1	0
Coal, splint, hard	4′	0″		
Slate, gray	0	0½		
Coal, slaty	0	2	4	2½
Fire clay				

The following prospect in the Chilton Coal was examined by Gawthrop in southwestern Logan:

Coal Prospect—No. 272 on Map II.

On the head of Cow Creek, 1.8 miles S. 80° W. of Oilville; Chilton Coal; elevation, 1230′ B.

			Feet	Inches
Sandstone, shaly				
Coal, soft	0′	6″		
Shale	0	1		
Coal, soft	1	0		
Coal, hard	1	8	3	3
Shale				

Triadelphia District, Logan County.

In Triadelphia District, the Chilton Coal, owing to its height in the hills and to the presence of the Campbell Creek (No. 2 Gas) Coal in a more easily accessible position below it, has not been prospected so thoroughly as in Logan District along the Coalburg Syncline. The prospects that have been made are nearly all located along Buffalo Creek.

In Chapter IV, the Chilton Coal is reported in the geologic section for Manbar, where only its blossom was seen. In Chapter VI, it is reported in the sections for Accoville, Sherman, Robinette, and Buffalo Creek.

The following prospect was examined by Gawthrop:

Stephen Browning Heirs Prospect—No. 273 on Map II.

On Buffalo Creek 0.3 mile southwest of Robinette; Chilton Coal; elevation, 1170′ L.

			Feet	Inches
Shale, dark, with iron ore nodules			3	0
Coal, medium hard	2′	0″		
Slate	0	0½		
Coal, gas	0	10		
Shale, gray	0	3½		
Coal, semi-splint	1	6		
Bone	0	1		
Coal, gas	0	10		
Shale, hard, sandy	0	11		
Coal, splint	2	3	8	9
Concealed				

The following is the only commercial mine operating the Chilton Coal in Triadelphia District:

Amherst Coal Co., Mine No. 2—No. 56 on Map II.

On Buffalo Creek, at Amherst; Chilton Coal; elevation, 1359′ L.

				Feet	Inches
1.	Shale, gray				
2.	Coal, hard	0′	10		
3.	Coal, semi-splint	1	2		
4.	Coal, gas	0	10		
5.	Shale, gray	0	5		
6.	Bone	0	2		
7.	Coal, semi-splint	0	6		
8.	Coal, gas	0	11		
9.	Coal, semi-splint	0	2½		
10.	Coal, gas	1	6		
11.	Coal, semi-splint	0	8		
12.	Slate	0	0½		
13.	Coal, gas	1	0	8	3
14.	Fire clay shale				

"Coal owned by Buffalo Creek Coal and Coke Co. and Stephen Browning Heirs; principal office, Oak Hill; daily capacity, 600 tons; daily output, 500 tons; 20 laborers and 40 miners employed; used for steam and domestic fuel; shipped west; mule and electric haulage; butts and faces, irregular; greatest rise, S. 70° E., pocket compass determination; sample collected from Nos. 2, 3, 4, 7, 8, 9, 10, 11 and 13 of section, at face of Main Heading, 500 feet from pit mouth, by R. M. Gawthrop; J. M. Schwertzer, Superintendent, authority for data"

The composition of this sample is reported under Mine No. 56 in the table at the end of this Chapter.

The following opening was examined by Hennen in the western end of Triadelphia District:

Coal Opening—No. 274 on Map II.

On the head of Buffalo Creek, 0.9 mile northwest of the corner of Logan, Boone and Wyoming Counties; Chilton Coal; elevation, 2085′ B.

			Feet	Inches
Shale, sandy			6	0
Sandstone			0	4
Coal, gas, hard	1′	8″		
Shale, gray	0	2		
Coal, splinty	3	4	5	2
Slate				

The following opening on Huff Creek, south of Buffalo, examined by Hennen, appears to be the Chilton Coal:

Coal Opening—No. 275 on Map II.

On Huff Creek, 2.2 miles east of Cyclone; **Chilton Coal**; elevation, 1805′ B.

			Feet	Inches
Sandstone			2	0
Shale, buff			3	0
Coal, gas	0′	4½″		
Slate, gray	0	2		
Coal, gas	4	7		
Shale, gray	0	7		
Fire clay, hard, flinty, dark, with conchoidal fracture	0	5		
Coal, slaty	0	2		
Shale, dark gray	0	1½		
Coal, splint, hard	2	9	9	2
Slate				

Harvey District, Mingo County.

In Harvey District, the Chilton Coal was observed frequently, but was found to have a variable section, ranging from 1′ to 12′ in thickness and usually containing so many slate partings as to make it of doubtful value for mining purposes. It was formerly mined along West Fork of Twelvepole Creek, above Dingess, but the mines were abandoned on account of impurities in the coal.

In Chapter IV, the Chilton Coal is noted in the geologic sections for Dingess and Hale. In Chapter VI, it is recorded in the sections for Cub Branch and Dingess Trace Branch.

The following prospect in the Chilton Coal was examined by Reger just across the Harvey District Line in Harts Creek District, Lincoln County:

Jackson Vance Prospect—No. 276 on Map II.

On East Fork of Twelvepole Creek, 2.7 miles N. 30° E. of Breeden; **Chilton Coal**; elevation, 835′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	6″		
Shale, gray	0	5½		
Coal	0	4		
Shale, gray	0	8		
Coal, splint	0	7		

			Feet	Inches
Shale, gray	0'	3½"		
Coal	0	4		
Shale, gray	0	8		
Coal	0	2		
Shale, gray	0	2		
Coal	0	3	4	5
Fire clay				

This coal was once opened on the opposite side of Twelvepole, about one-half mile southeast of the Vance Prospect, but the mine had fallen shut.

The coal has been mined by stripping about one-third mile up Alex Branch of Twelvepole Creek, but the hole was full of water and could not be examined.

The following exposure of the coal was examined by Reger:

Coal Prospect, Meeken Marcum—No. 277 on Map II.

On the Righthand Fork of Caney Creek, 1.5 miles northeast of Kirk; Chilton Coal; elevation, lower bench, 985' B.

				Feet	Inches
Sandstone, massive					
Shale, gray				1	0
Coal	0'	3"	Chilton, Upper Bench		
Shale, gray	0	4			
Coal	0	3		0	10
Fire clay, concealed, and shale				22	0
Coal, soft	1'	5"	Chilton, Lower Bench		
Slate, black, coaly	0	7			
Coal, splinty	0	9		2	9
Fire clay					

The coal is mined by stripping at two or three places on the head of Main Caney Creek, but the openings were filled with dirt or water and could not be examined. At one of them, 1' 2" of good splint coal was observed above the water.

On the other fork of Twelvepole, farther south, the following exposure of what seems to be the Chilton Coal was observed by Reger, 170 feet below an abandoned prospect in the Coalburg Coal, previously mentioned:

Coal Exposure—No. 278 on Map II.

On Hickory Branch of West Fork of Twelvepole Creek, 1.3 miles northwest of Breeden; **Chilton Coal**; elevation, 940′ B.

			Feet	Inches
Sandstone, massive			30	0
Shale, gray			2	0
Coal	0′	11″		
Shale, gray	0	2		
Coal	0	4		
Slate, black	0	1		
Coal	0	2	1	8
Fire clay			1	0
Sandstone, massive				

The following exposure was observed by Reger farther south:

Coal Prospect—No. 279 on Map II.

On the head of Turkey Creek, 2.2 miles S. 25° W. of Breeden; **Chilton Coal**; elevation, 915′ B.

			Feet	Inches
Sandstone, massive				
Concealed			20	0
Shale, dark			2	0
Coal	1′	2″		
Slate, black, with coal	0	6		
Coal, splint	1	5	3	1
Fire clay				

On Openmouth Branch of West Fork of Twelvepole. 2 miles southeast of Breeden, one foot of slaty coal was observed by Reger at **Prospect No. 280 on Map II**, at an elevation of 995′ B., 195′ below a prospect in the Coalburg Coal, previously described.

The following prospect was observed by Reger on another branch:

Coal Prospect—No. 281 on Map II.

On a branch of West Fork of Twelvepole Creek, 2 miles northeast of Kirk; **Chilton Coal**; elevation, 1035′ B.

	Feet	Inches
Shale, gray		
Coal, splinty	1	2
Concealed by water		

The following is another prospect examined by Reger:

Guyandot Land Association Prospect—No. 282 on Map II.

On Dingess Trace Branch of West Fork of Twelvepole Creek, 0.8 mile north of Dingess; Chilton Coal; elevation, 1105′ B.

			Feet	Inches
Shale, gray				
Coal, soft	0′	11″		
Slate, black	0	2		
Coal, semi-splint	0	5		
Coal, splint	0	5		
Coal, soft	0	9	2	8
Fire clay and concealed			3	0
Sandstone, massive				

In the neighborhood of Dingess and south and east from that town in Harvey District, the Chilton Coal becomes a thick, multiple bedded seam, with numerous slate and shale partings, but containing several benches of good coal.

The **G. W. Damron Farm Mine (No. 283 on Map II),** located on West Fork of Twelvepole Creek, 0.8 mile southeast of Dingess, and having an elevation of 1180′ B., was used in compiling the geologic section for Dingess, published in Chapter IV. At this mine the coal is operated extensively for local use and furnishes a good quality of coal.

At an old prospect, **No. 284 on Map II,** opposite the mouth of Moses Fork of Twelvepole, 1.2 miles southeast of Dingess, 7 feet of rotten coal was observed at the mouth of the prospect, which had fallen shut, the tidal elevation being 1121′ by hand level.

Another prospect examined by Reger a short distance away shows the following:

J. E. Elkins Prospect—No. 285 on Map II.

On West Fork of Twelvepole Creek, 1.4 miles southeast of Dingess; Chilton Coal; elevation, 1100′ B.

			Feet	Inches
Shale, gray				
Coal	2′	2″		
Slate, black	0	7		
Coal, blocky	1	2		
Coal, slaty	1	7		
Coal, soft	1	10		
Shale, with coal streaks	0	8		
Coal, splint	3	1	11	1
Fire clay				

At **Opening No. 286 on Map II,** located on Twelvepole Creek, 1.6 miles southeast of Dingess, the Chilton Coal was formerly mined commercially by the **Mingo Block Coal Co.,** the tidal elevation of the coal being 1150′ B., but the mine has been abandoned completely and has fallen shut.

At another abandoned commercial opening farther up the creek, the following section was obtained by Reger:

Mingo Block Coal Co. Mine (Abandoned)—No. 287 on Map II.

On West Fork of Twelvepole Creek, 2 miles southeast of Dingess; Chilton Coal; elevation, 1135′ B.

			Feet	Inches
Coal, block	2′	0″		
Slate, black	0	8		
Coal, medium hard	2	1		
Coal, slaty	1	5		
Coal, medium hard	1	5		
Slate, soft	0	1		
Coal	0	2		
Slate, black	0	2		
Coal, splint	1	8	9	8
Concealed				

The Chilton Coal was once opened at **Prospect No. 288 on Map II,** on the head of Twelvepole Creek, 2.7 miles southeast of Dingess, at an elevation of 1190′ B., along the trail leading across to Holden, but the prospect had fallen shut when visited by Reger and could not be measured.

The coal was once opened at **Prospect No. 289 on Map II,** at a tidal elevation of 1140′ B., almost directly over the line of the Norfolk & Western Railway tunnel, 0.8 mile southward from Dingess. When visited by Reger the opening had fallen shut, but the refuse and nature of the prospect indicated a thick coal.

The Chilton Coal has been prospected thoroughly along the waters of Laurel Fork of Pigeon Creek, where it is a thick coal, but contains many slate partings.

At one of these prospects, the following section was measured by Reger:

Mingo Block Coal Co. Prospect—No. 290 on Map II.

On Laurel Fork of Pigeon Creek, 1.4 miles east of Hale; **Chilton Coal**; elevation, 1095' B.

			Feet	Inches
Shale, gray				
Coal	0'	3"		
Shale, gray	0	4		
Coal, soft	1	10		
Slate, black	0	4		
Coal, soft	1	8		
Coal, slaty	1	8		
Coal, semi-splint	2	0		
Shale, gray	0	7		
Coal, splint	1	9	10	5
Sandstone, massive				

Another prospect, examined by Reger, shows the following:

Mingo Block Coal Co. Prospect—No. 291 on Map II.

On Panther Branch of Laurel Fork of Pigeon Creek, 1.5 miles southeast of Hale; **Chilton Coal**; elevation, 1175'

			Feet	Inches
Sandstone, massive				
Coal, soft	1'	0"		
Slate, black	0	8		
Coal, soft	1	7		
Slate, with streaks of coal	1	8		
Coal, semi-splint	2	1		
Shale, gray	1	6		
Coal, splint	1	8	10	2
Fire clay and concealed			2	0
Sandstone, massive, in Panther Branch				

The following opening was examined and sampled by Reger farther up Laurel Fork:

John Vance Farm Mine—No. 59 on Map II.

On Laurel Fork of Pigeon Creek, 3 miles southeast of Hale; **Chilton Coal**; elevation, 1230' B.

			Feet	Inches
1. Coal, soft, with streaks of slate	2'	6"		
2. Slate, black	0	3		
3. Coal, medium hard	0	3		
4. Coal, slaty	0	5		

				Feet	Inches
5.	Coal, semi-splint	1'	3"		
6.	Slate, gray, with coal streaks	0	8		
7.	Coal, splint	1	8	7	0
8.	Fire clay				

A sample for analysis was collected from Nos. 5 and 7 of section, the composition of which is published under Mine No. 59 in the table at the end of this Chapter. The analysis shows a coal somewhat high in ash, but very low in sulphur and phosphorus and high in volatile matter.

The **James Blankenship Prospect (No. 292 on Map II),** located on Laurel Fork of Pigeon, 3.1 miles southeast of Hale, at a tidal elevation of 1270′ B., had fallen shut when visited by Reger, but it was reported 11 feet thick by Mr. Blankenship.

The Chilton Coal is opened for farm use along the Norfolk & Western Railway near the abandoned village of Prendergast, where Reger measured the following section:

John Henderson Farm Mine No. 293 on Map II.

On Laurel Fork of Pigeon Creek, 0.6 mile northeast of Hale; Chilton Coal; elevation, 1016′ H. L.

			Feet	Inches
Sandstone, massive			15	0
Coal, soft	1'	1"		
Slate, black	0	7		
Coal, semi-splint	1	5		
Coal, softer	0	10		
Slate	0	9		
Coal, splint	1	10	6	6
Fire clay				

The following prospect was examined by Reger in the same region:

Mingo Block Coal Co. Prospect—No. 294 on Map II.

On Laurel Fork of Pigeon Creek, 0.3 mile east of Hale; Chilton Coal; elevation, 1010′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			2	0
Coal, soft	1'	3"		
Slate, black	0	6		
Coal, blocky	1	10½		

			Feet	Inches
Coal, slaty	1'	6"		
Coal, soft	1	11		
Shale, gray, with streaks of coal	1	6		
Coal, splint	2	10	11	4½
Fire clay				

The **Mingo Block Coal Co. Prospect (No. 295 on Map II),** located on Pawpaw Branch of Laurel Fork, 0.7 mile southeast of Hale, at a tidal elevation of 1040′ B., as measured by I. C. White and published in Volume II(A), page 422, of the State Survey Reports under the name of the "Thacker" Coal, has been used in the section for Hale, published in Chapter IV of the present Report. The section of the coal here shows a remarkable similarity to that of the Coalburg at a Prospect (No. 10 on Map II) in the hill above it.

Another prospect, examined by Reger, shows the following:

Mingo Block Coal Co. Prospect—No. 296 on Map II.

On Laurel Fork of Pigeon Creek, 0.6 mile southwest of Hale; **Chilton Coal**; elevation, 985′ B.

			Feet	Inches
Shale, gray				
Coal, soft	1'	6"		
Slate, black	0	6		
Coal, soft	1	3		
Coal, slaty	1	6		
Coal, semi-splint	2	1		
Shale, gray	1	6		
Coal, splint	2	1	10	5
Fire clay				

The following prospect was examined by Reger farther down Laurel Fork:

Mingo Block Coal Co. Prospect—No. 297 on Map II.

On Lick Branch of Laurel Fork of Pigeon Creek, 1.5 miles southwest of Hale; Chilton Coal; elevation, 1010′ B.

			Feet	Inches
Sandstone, massive			15	0
Coal, soft, with lenticular sandstone interbedded	2′	4″		
Slate, black	0	4		
Coal, soft	1	3		
Coal, bony	1	3		
Coal	2	0	7	2
Concealed by water				

The top of the coal at this prospect is 27 feet by hand level measurement under a prospect in the Chilton "A" Coal that is 4′ 5″ thick, the section of which is published in Chapter VI.

The following prospect was examined by Reger:

John Evans Prospect—No. 298 on Map II.

On Laurel Fork of Pigeon Creek, 1.8 miles southwest of Hale; Chilton Coal; elevation, 1000′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			1	6
Coal, soft	1′	10″		
Slate, black	0	5		
Coal, soft	1	2		
Coal, slaty	1	4	4	9
Concealed				

Warfield District Mingo County

In Warfield District, the Chilton Coal has been prospected in numerous places and frequently found to be good. Along the upper half of Marrowbone Creek, it is mined for local use and yields a good quality of fuel, but, as in Harvey District, contains several slate and shale partings that must be carefully separated from the coal.

In the section for Kermit, published in Chapter IV, the Chilton Coal is reported 5 feet thick, as given in the record of the Hiram Stepp No. 409 (No. 137 on Map II) gas well.

In the extreme northern corner of the district, the following prospect was examined by Reger:

Coal Prospect—No. 299 on Map II.

On the head of Anderson Branch of Jennie Creek, 2 miles east of Dicy; Chilton Coal; elevation, 925' B.

			Feet	Inches
Sandstone, shaly				
Coal	0'	6"		
Shale, gray	1	0		
Coal, splint	1	6	3	0
Shale, gray, and black slate			15	0

The following opening was examined by Reger just southeast of where the Warfield Fault crosses Marrowbone Creek:

Lee Bates Prospect—No. 300 on Map II.

On Marrowbone Creek, 2.3 miles northeast of Kermit; Chilton Coal; elevation, 860' B.

			Feet	Inches
Sandstone, massive				
Coal, soft	0'	11"		
Slate, dark	0	1		
Coal	0	6		
Slate, gray	0	3		
Coal, visible	2	6	4	3
Concealed by water and mud				

The coal was dipping rapidly southeastward and the opening was abandoned on account of water.

The following prospect was examined by Reger farther up Marrowbone Creek:

Caroline Brewer Prospect—No. 301 on Map II.

At the mouth of Barkcamp Branch of Marrowbone Creek, 2.1 miles southeast of Spaulding; Chilton Coal; elevation, 880' B.

			Feet	Inches
Sandstone, massive				
Shale, gray			1	0
Coal, slaty	0'	7"		
Coal, soft	5	4		
Slate, dark	1	0		
Coal	1	4	8	3
Slate				

Another prospect, examined by Reger, shows the following:

Coal Prospect—No. 302 on Map II.

On Marrowbone Creek, near the Pat Flat, 2.1 miles southeast of Spaulding; Chilton Coal; elevation, 845′ B.

			Feet	Inches
Shale, sandy				
Coal, slaty	1′	0″		
Coal, soft	2	0		
Slate, black	0	1		
Coal, soft	2	0		
Shale, gray	0	4		
Coal	0	5		
Shale, dark, coaly	0	9		
Coal, splint	1	3	7	10
Fire clay				

Two prospects have been opened on the head of Neely Branch along the steep structural slope south of the Warfield Fault. Their sections, as measured by Reger, are as follows:

Wm. Patton Prospect (Lower)—No. 303 on Map II.

On Neely Branch of Marrowbone Creek, 2.6 miles east of Spaulding; Chilton Coal; elevation, 980′ B.

			Feet	Inches
Shale, gray				
Slate, black			1	0
Coal, soft	2′	9″		
Slate, black	0	2		
Coal	0	9		
Shale, dark	0	3		
Coal	0	2		
Shale, dark	0	6		
Coal, splint	1	5	6	0
Shale				

Wm. Patton Prospect (Upper)—No. 304 on Map II.

On the head of Neely Branch of Marrowbone Creek, 2.7 miles east of Spaulding; Chilton Coal; elevation, 1035′ B.

			Feet	Inches
Shale, sandy				
Coal			1	0
Shale, sandy			4	0
Slate, black			1	6
Coal, soft	2′	6″		
Slate, black	0	4		
Coal	0	8		
Slate, dark	1	0		
Coal, splint	1	7	6	1
Fire clay				

Another opening, examined by Reger, shows the following:

Burning Creek-Marrowbone Land Co. Prospect—No. 305 on Map II.

On Marrowbone Creek, at the mouth of Little Laurel Branch, 3 miles southeast of Spaulding; Chilton Coal; elevation, 790′ B.

			Feet	Inches
Sandstone, shaly				
Coal, slaty	0′	7″		
Coal, soft	2	1½		
Cannel coal	0	1		
Coal	0	9½		
Slate, dark	0	4		
Coal	0	8		
Slate, dark, with coal streaks at top	1	0		
Coal, splint	1	8	7	3
Shale and concealed				

Another prospect, examined by Reger, shows the following:

Coal Prospect—No. 306 on Map II.

On Cub Branch of Marrowbone Creek, 3 miles S. 60° E. of Spaulding; Chilton Coal; elevation, 795′ B.

			Feet	Inches
Sandstone, massive				
Shale			1	0
Coal, slaty	3′	0″		
Shale, gray	5	6		
Coal, splint	0	6		
Coal, bony	2	0		
Coal, gas	3	0		
Slate, dark, with coal	0	9		
Coal	0	11		
Slate, coaly	0	9		
Coal, splint	1	5	17	10
Fire clay				

The following opening was examined by Reger:

George Hannah Prospect—No. 57 on Map II.

On Big Laurel Branch of Marrowbone Creek, 3.5 miles southeast of Spaulding; Chilton Coal; elevation, 810′ B.

				Feet	Inches
1.	Shale, sandy				
2.	Coal, slaty	1′	8″		
3.	Coal, gas	2	8		
4.	Cannel slate	0	1½		
5.	Coal	0	2½		
6.	Slate, dark	0	4		
7.	Coal, semi-splint	0	10		
8.	Coal, bony	0	7		
9.	Slate, dark	0	5		
10.	Coal, splint	1	4	8	2
11.	Shale				

A sample was collected for analysis from Nos. 3, 7 and 9 of section, the composition of which is published under Mine No. 57 in the table at the end of this Chapter. The analysis shows a good grade of steam coal, low in ash.

Another prospect, near by, shows the following, according to Reger:

Martha J. Hall Prospect—No. 307 on Map II.

On Big Laurel Branch of Marrowbone Creek, 4 miles southeast of Spaulding; Chilton Coal; elevation, 830′ B.

			Feet	Inches
Sandstone, massive				
Coal	2′	0″		
Slate, gray	1	0		
Coal, slaty	0	6		
Shale, sandy	6	0		
Coal, slaty	1	2		
Coal	1	4		
Slate, soft	0	2		
Coal	2	0		
Slate, dark	0	4		
Coal	1	0	15	6
Slate, pavement				

At the mouth of Messer Branch of Marrowbone Creek, the **Stewart Wood Prospect (No. 308 on Map II)**, at a tidal elevation of 845′ B., had fallen shut when visited by Reger, but it was reported a thick coal by Anthony Brewer, a resident. This prospect is 220 feet by hand level below a prospect in the Coalburg Coal in the hill above it. As in the Dingess region in Harvey District, these two coals have a similar section, making careful stratigraphic work necessary to avoid confusing them.

The Chilton Coal was formerly mined for local use at the **Anthony Brewer Prospect (No. 309 on Map II),** at a tidal elevation of 880′ B., on Messer Branch of Marrowbone Creek, one-half mile north of the prospect last mentioned, and about three-fourths mile south of Swelled Hickory Gap. It had fallen shut when visited by Reger.

Another opening farther up the same creek shows the following, according to Reger:

H. C. Closterman Mine—No. 310 on Map II.

On Dan Branch of Marrowbone Creek, 2.3 miles southeast of Kirk; Chilton Coal; elevation, 940′ B.

			Feet	Inches
Sandstone, massive				
Coal, slaty	0′	3″		
Shale, gray	3	8		
Coal, soft	0	10		
Slate, black	0	1		
Coal	0	11		
Slate, dark	0	5		
Coal, gas	1	0		
Slate, sandy	0	5		
Coal	0	4		
Slate, dark	0	7		
Coal, splint	1	9		10	3
Fire clay				

Coal from this opening was once used to fire the boilers of a large saw mill that was located at the mouth of Dan Branch.

Another opening measured by Reger farther up Marrowbone Creek shows the following:

John Beckett Prospect— No. 311 on Map II.

On Marrowbone Creek, 2.2 miles southeast of Kirk; Chilton Coal; elevation, 880′ B.

			Feet	Inches
Sandstone, massive, cliff rock, Upper Chilton				
Coal, soft	1′	1″		
Slate, dark	0	6		

			Feet	Inches
Coal, soft	1′	6″		
Slate, gray	0	1½		
Coal	0	6½	3	9
Fire clay and concealed			2	0
Sandstone, massive, to creek			10	0

In this region, the course of Marrowbone Creek is closely parallel to that of the Warfield Fault, which is north of the creek. From the creek, the rise of the strata is abrupt toward the fault. An opening examined by Reger close to the fault shows the following:

John Dillon Opening—No. 312 on Map II.

On Marrowbone Creek, 1.8 miles S. 15° W. of Kirk; Chilton Coal; elevation, 960′ B.

			Feet	Inches
Sandstone, massive				
Slate, gray			0	8
Coal	0′	3″		
Shale, gray	0	10		
Coal	1	4	2	5
Concealed by water				

Another prospect, located south of the last one described, shows the following, according to Reger:

Stewart Wood Prospect—No. 313 on Map II.

On Marrowbone Creek, 2 miles S. 15° W. of Kirk; Chilton Coal; elevation, 915′ B.

			Feet	Inches
Sandstone, massive				
Concealed			5	0
Coal	1′	4″		
Shale, dark	0	5		
Coal, visible	2	0	3	9
Concealed by water				

The coal is mined by stripping at several points along Marrowbone Creek near the school-house above the Wood prospect and good coal is secured. A digging near the roadside just below the school-house shows the following, according to Reger:

Coal Prospect—No. 314 on Map II.

At the mouth of Lick Branch of Marrowbone Creek, 2 miles S. 5° W. of Kirk; Chilton Coal; elevation, 950′ B.

			Feet	Inches
Sandstone, massive				
Shale, sandy			3	0
Coal, soft	1′	7″		
Slate, dark	0	5		
Coal, splint	1	1		
Slate, dark	0	3		
Coal	0	6	3	10
Fire clay and concealed			10	0
Coal, mined by stripping, thickness concealed				

An exposure above the school-house, examined by Reger, shows the following:

Coal Prospect—No. 315 on Map II.

On Marrowbone Creek, 2.2 miles south of Kirk; Chilton Coal; elevation, 995′ B.

			Feet	Inches
Sandstone, massive				
Concealed			10	0
Coal	1′	2″		
Shale, dark	0	5		
Coal	1	7		
Slate, dark	1	6		
Coal, splint	1	9	6	5
Fire clay				

Hardee District, Mingo County.

In Hardee District, the Chilton Coal has been frequently prospected and often shows a good thickness of coal. As in Harvey and Warfield Districts, it usually contains slate partings that injure its commercial value, but by careful mining a large part of this coal may be profitably recovered.

In Chapter IV, the Chilton Coal is reported in the section for Naugatuck, where it is 7′ 1″ thick, with a large parting.

In the western end of Hardee District, Hennen reports an abandoned prospect in the Chilton Coal, 1.5 miles northwest of Naugatuck, at a tidal elevation of 765′ B. The opening had fallen shut.

On the Kentucky side of Tug Fork, opposite Naugatuck, the coal has been mined at several points for local use and is about 4 feet thick, with no partings of consequence, according to Reger.

The following is an opening in the Chilton Coal, examined by Reger, at the northern edge of Hardee District:

Perry Evans Prospect—No. 316 on Map.

On the head of Road Branch of Big Branch of Pigeon Creek, 2.5 miles N. 20° E. from Blocton; Chilton Coal; elevation, 860′ B.

			Feet	Inches
Sandstone, massive				
Coal, bony	0′	10″		
Coal, soft	2	5		
Slate, black	0	1		
Coal, splint	0	10		
Slate, black, soft	0	4		
Coal	1	0		
Coal, bony	0	8		
Coal, splint	1	2	7	4
Shale				

The following is an opening on another fork of the same branch, examined by Reger:

Peter Maynard Farm Mine—No. 317 on Map II.

On Big Branch of Pigeon Creek, 2.3 miles northeast of Blocton; Chilton Coal; elevation, 875′ B.

			Feet	Inches
Sandstone, shaly				
Coal	0′	2″		
Shale, dark	0	8		
Coal, bony	0	10		
Coal, soft	1	4		
Slate,	0	0½		
Coal	0	3		
Slate	0	0½		
Coal, semi-splint	1	2		
Coal, splint	0	10		
Slate, dark	0	6		
Coal, splint	0	7	6	5
Slate, dark, pavement				

About three-fourths mile west of Eugene, the Chilton Coal was prospected at a tidal elevation of 780′ B., but the prospect had fallen shut when visited by Reger. According to a resident, it was 8 feet thick, "with lots of slate".

A prospect, examined by Reger, farther north, shows the following:

Stewart Wood Prospect—No. 318 on Map II.

On Bearpen Branch of Cool Spring Fork of Laurel, 2 miles northwest of Canterbury; **Chilton Coal**; elevation, 920′ B.

			Feet	Inches
Sandstone, massive				
Coal	3′	0″		
Shale, gray	0	5		
Coal, visible	0	10		
Concealed	3	0	7	3
Slate, pavement				

The bottom portion of the prospect was concealed by a rock slide, but the pavement was visible, on the outside, giving a rough measurement of the thickness. According to a resident, the coal was found to be 9 feet thick, but this figure is evidently too large.

The following prospect was examined by Reger:

Coal Prospect—No. 319 on Map II.

On Laurel Fork of Pigeon Creek, 0.2 mile southeast of Canterbury; **Chilton Coal**; elevation, 855′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	5½″		
Slate	0	0½		
Coal	0	3		
Shale, gray	2	0		
Coal, splint	2	4	5	1
Sandstone				

The following prospect was examined by Reger at the Hardee-Harvey District Line:

Frank Blair Prospect—No. 320 on Map II.

On Laurel Fork of Pigeon Creek, 1 mile east of Canterbury; **Chilton Coal**; elevation, 1065′ B.

			Feet	Inches
Sandstone, shaly				
Coal	0′	2½″		
Slate, gray	0	0½		
Coal, gas	0	10		
Coal, splint	1	1	2	2

The following exposure of the Chilton Coal was examined by Reger in a ravine:

Coal Exposure—No. 321 on Map II.

On Right Fork of Laurel Fork, 0.9 mile southeast of Rapp; Chilton Coal; elevation, 845′ B.

			Feet	Inches
Sandstone, massive				
Shale			1	0
Coal	0′	8″		
Shale, gray	0	2		
Coal	0	4		
Shale, gray	0	10		
Coal	0	6	2	6
Fire clay				

A prospect on the waters of the same stream examined by Reger shows the following:

Coal Prospect—No. 322 on Map II.

On Buck Branch of Right Fork of Laurel, 1.4 miles S. 10° W. of Hale; Chilton Coal; elevation, 1065′ B.

			Feet	Inches
Shale, sandy				
Coal, soft	1′	5″		
Coal, cannel	0	3		
Coal, soft	0	5		
Slate, black	0	5		
Ccal, soft	1	8		
Coal, slaty	1	8		
Ccal, splint	2	0	7	10
Fire clay				

The **Harry Evans Prospect (No. 323 on Map II)**, located 3.2 miles N. 80° E. of Rapp, at a tidal elevation of 1105′ B., had fallen shut when visited by Reger, but was reported about the same as the prospect on Buck Branch by Mr. Evans.

Another prospect in the same region, examined by Reger, shows the following:

Mingo Block Coal Co. Prospect—No. 324 on Map II.

On Millstone Branch of Right Fork of Laurel, 1.6 miles S. 15° E. of Hale; Chilton Coal; elevation, 1110′ B.

			Feet	Inches
Coal	2′	8″		
Slate, black	0	5		
Concealed and coal	5	5	8	6
Concealed				

The coal at this prospect was much weathered and partly concealed, making it impossible to secure an accurate section.

A prospect farther up the fork, examined by Reger, shows the following:

Evan Akers Farm Mine—No. 58 on Map II.

On Right Fork of Laurel, at the mouth of Ashcamp Branch, 2.2 miles S. 15° E. of Hale; Chilton Coal; elevation, 1145′ B.

				Feet	Inches
1.	Coal, about			2	0
2.	Shale, silicious			10	0
3.	Shale, dark			5	0
4.	Coal, hard, blocky	2′	7″		
5.	Shale, gray	1	4		
6.	Coal, hard, splint	2	3	6	2
7.	Fire clay				

A sample was collected for analysis from Nos. 4 and 6 of section, the composition of which is published under Mine No. 58 in the table at the end of this Chapter. The analysis shows the coal to be high in ash, but low in sulphur and phosphorus.

On main Pigeon Creek, above Lenore, several prospects have been made in the Chilton Coal, but some have fallen shut, leaving the coal only poorly exposed. The following opening was examined by Reger:

M. L. White Farm Mine—No. 325 on Map II.

On Pigeon Creek, at the mouth of White Branch, 2 miles southeast of Lenore; Chilton Coal; elevation, 840′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	3″		
Slate	0	1		
Coal	0	2½		
Shale, gray	0	1		
Coal	0	8½		
Shale, gray	0	1		
Coal	0	3		
Slate, black	0	2		
Coal, splint	1	6	3	4
Fire clay				

The following opening was examined by Hennen a short distance up White Branch:

Coal Opening—No. 326 on Map II.

On White Branch of Pigeon Creek, 2 miles southeast of Lenore; **Chilton Coal**; elevation, 805′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas, hard	1′	0″		
Shale, gray	0	1		
Coal	0	2		
Slate, black	0	1		
Coal, splint	1	5	2	9
Slate				

The following prospect was examined by Reger on another branch:

Coal Prospect—No. 327 on Map II.

On Board Branch of Pigeon Creek, 2.7 miles southeast of Lenore; **Chilton Coal**; elevation, 835′ B.

			Feet	Inches
Sandstone, massive				
Shale			0	2
Coal	0′	8″		
Slate, dark	0	1		
Coal	2	4	3	1
Shale			0	6
Sandstone, massive				

The following opening was examined by Reger:

W. J. Williamson Prospect—No. 328 on Map II.

On the northern fork of Big Branch of Pigeon Creek, 3 miles S. 75° E. of Lenore; **Chilton Coal**; elevation, 860′ B.

			Feet	Inches
Sandstone				
Shale, sandy			6	0
Coal	0′	3″		
Shale, gray	0	4		
Coal	0	9		
Shale, gray	0	4		
Coal, splint	0	9½		
Slate, dark	0	2½		
Coal, slaty	0	7	3	3
Fire clay				

The Chilton Coal has been prospected along Trace Fork, which puts into Pigeon Creek, 3.3 miles above Lenore. At one of these openings, the following section was observed by Reger:

Floyd Mount Prospect—No. 329 on Map II.

On a branch of Trace Fork, 2.2 miles west of Myrtle; **Chilton Coal**; elevation, 890′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			5	0
Coal	0′	5″		
Slate, gray	0	1		
Coal	0	9		
Slate, with streaks of coal	0	10		
Coal, splint	1	1		
Slate, black	0	2		
Coal, splint	1	2	4	6
Fire clay				

The following opening was observed by Reger on another branch:

J. E. Hatfield Prospect—No. 330 on Map II.

At the mouth of Spring Branch of Trace Fork, 1.5 miles west of Myrtle; **Chilton Coal**; elevation, 915′ B.

			Feet	Inches
Sandstone, massive				
Coal	1′	1″		
Slate, gray	0	1		
Coal	0	3		
Shale, gray	0	4		
Coal,	1	0		
Slate, black, hard	0	2		
Coal	0	8	3	7
Fire clay				

The coal has been opened on Duncan Fork, where the two following prospects were examined by Reger:

Coal Prospect—No. 331 on Map II.

On Duncan Fork of Trace Fork, 0.8 mile southeast of Myrtle; **Chilton Coal**; elevation, 1000′ B.

			Feet	Inches
Shale, sandy				
Coal,	0′	9″		
Shale, gray	1	5		
Coal	1	9		
Slate, black	0	3		
Coal	0	6	4	8
Concealed by water				

The other opening, not far away, shows the following:

Eli Brewster Prospect—No. 332 on Map II.

On Duncan Fork of Trace Fork, 0.9 mile southeast of Myrtle; Chilton Coal; elevation, 1000′ B.

			Feet	Inches
Sandstone				
Shale, sandy			3	0
Coal	0′	10″		
Shale, gray	0	10		
Coal, splint	1	5		
Slate, dark	0	6		
Coal, semi-splint	1	0	4	7
Fire clay				

On Riffe Branch of Trace Fork, a prospect in the Chilton Coal was once made, 265′ below an opening in the Stockton Coal, previously described, but the prospect had fallen shut when visited by Reger and the coal could not be measured.

Prospect No. 333 on Map II, located on the head of Right Fork of Trace Fork, 3.6 miles S. 85° E. of Myrtle, having a tidal elevation of 1055′ B., had fallen shut when visited by Reger, but was reported 30″ thick by residents.

On the southern branch of the same fork, the following prospect was examined by Reger:

James Gilman Prospect—No. 334 on Map II.

On Right Fork of Trace Fork, 2 miles northeast of Bias; Chilton Coal; elevation, 1070′ B.

			Feet	Inches
Sandstone, massive				
Slate, coaly			0	6
Shale, sandy			5	0
Coal, soft	0′	9″		
Slate, dark	0	1		
Coal, splint	1	4		
Fire clay, concealed, and fire clay	4	0		
Coal	0	6	6	8
Fire clay				

An opening examined by Reger on another branch shows the following:

Coal Prospect—No. 335 on Map II.

On Dingess Camp Branch of Trace Fork, 3.4 miles northeast of Myrtle; Chilton Coal; elevation, 1090' B.

			Feet	Inches
Shale				
Coal	0'	6"		
Shale, sandstone and shale	5	0		
Coal	1	0	6	6
Fire clay				

The following exposure was examined by Reger in a ravine:

Coal Exposure—No. 336 on Map II.

On the head of Trace Fork of Pigeon Creek, 3.4 miles N. 80° E. of Myrtle; Chilton Coal; elevation, 1080' B.

			Feet	Inches
Sandstone, massive			30	0
Shale, gray			1	0
Coal	0'	4"		
Shale, gray	1	6		
Coal	0	3		
Shale, gray	0	6		
Coal	0	2		
Shale, gray	5	0		
Coal	0	6	8	3
Fire clay, visible				

Near the southern boundary of Hardee District, the following prospect was examined by Reger:

Zaccheus Dustin Prospect—No. 337 on Map II.

On Road Branch of Tug Fork, 1.5 miles east of Maher Station; Chilton Coal; elevation, 860' B.

			Feet	Inches
Shale, sandy				
Coal, gas	0'	11"		
Slate, dark, soft	0	3		
Coal, semi-splint	1	0	2	2
Fire clay				

Lee District, Mingo County.

In Lee District, the Chilton Coal has not been so well prospected as in Hardee, and the few openings observed do not indicate a coal seam of any considerable importance.

Prospect No. 338 on Map II, located on Conley Branch of Pigeon Creek, 4 miles southwest of Myrtle, at a tidal elevation of 950′ B., had fallen shut when visited by Gawthrop, but the coal was reported a thin seam with a slate parting by residents.

The Chilton Coal has been prospected at several places along Elk Creek, tributary to Pigeon. The following is an opening examined by Gawthrop:

Coal Prospect—No. 339 on Map II.

On Fivemile Creek of Elk Creek, 1.1 miles northeast of Bias; Chilton Coal; elevation, 1070′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	0′	9″		
Slate, black	0	3		
Coal, hard	1	6	2	6
Shale				

The following is another prospect examined by Gawthrop in the same region:

Coal Prospect—No. 340 on Map II.

On Left Fork of Elk Creek, 2.1 miles east of Bias; Chilton Coal; elevation, 1090′ B.

			Feet	Inches
Sandstone, massive			8	0
Shale			1	0
Coal, gas	0′	10″		
Slate, black	0	3		
Coal, hard, visible	1	3	2	4

Another prospect a short distance north shows the following according to Gawthrop:

Coal Prospect—No. 341 on Map II.

On Left Fork of Elk Creek, 2.1 miles east of Bias; Chilton Coal; elevation, 1095′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	9″		
Slate, black	0	3		
Coal, hard	2	0	3	0
Shale				

Another opening examined by Gawthrop shows the following:

Coal Opening—No. 342 on Map II.

On Loggy Branch of Elk Creek, 1.9 miles southeast of Bias; Chilton Coal; elevation, 1105′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal	0′	10″		
Slate	0	3		
Coal, visible	1	2	2	3
Concealed				

The following is another prospect observed in the same region by Gawthrop:

Coal Prospect—No. 343 on Map II.

On Right Fork of Elk Creek, 0.9 mile south of Bias; Chilton Coal; elevation, 1120′ B.

			Feet	Inches
Shale				
Coal, gas	0′	9″		
Shale, gray	0	6		
Coal, hard, visible	1	8	2	11
Concealed				

The following prospect, examined by Gawthrop, is in the same region:

Coal Opening—No. 344 on Map II.

On Middle Fork of Elk Creek, 1.4 miles southeast of Bias; Chilton Coal; elevation, 1100′ B.

			Feet	Inches
Sandstone, massive			10	0
Shale			4	0
Coal, gas	0′	9″		
Slate, black,	0	3		
Coal, hard	2	4	3	4
Shale				

The following opening, examined by Gawthrop, is farther up the same fork:

John H. Baisden Opening—No. 345 on Map II.

On Middle Fork of Elk Creek, 2.1 miles southeast of Bias; Chilton Coal; elevation, 1110′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	6″		
Slate	0	2		
Coal, hard	2	0	2	8
Shale				

Another opening, examined by Gawthrop, a short distance from the last, shows the following:

Coal Opening—No. 346 on Map II.

On Middle Fork of Elk Creek, 2.3 miles southeast of Bias; Chilton Coal; elevation, 1105′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	8″		
Slate	0	2		
Coal, visible	1	3	2	1

On Rockhouse Fork, the Chilton Coal is of uncertain value. The following is a prospect examined by Gawthrop:

Coal Prospect—No. 347 on Map II.

On Spring Branch of Rockhouse Fork, 1.8 miles northeast of Varney; Chilton Coal; elevation, 1365′ B.

			Feet	Inches
Sandstone, massive				
Coal, cannel	0′	8″		
Slate	0	2		
Coal, hard	0	3		
Slate, bony	0	2		
Coal	0	7		
Slate	0	1		
Coal, hard	0	3	2	2
Shale				

The following opening was examined by Reger:

Coal Opening—No. 348 on Map II.

On a branch of Rockhouse Fork, 2.9 miles S. 80° E. of Ragland; Chilton Coal; elevation, 1260' B.

			Feet	Inches
Sandstone, massive				
Shale, sandy			3	0
Coal, slaty	0'	2"		
Shale	1	0		
Coal	0	8		
Shale, gray	2	0		
Concealed (reported coal)	3	0	6	10
Sandstone, massive				

The opening had fallen shut, but coal was once mined from it and was reported 2 to 3 feet thick.

The following prospect was examined by Reger:

United Thacker Coal Co. Prospect—No. 349 on Map II.

On a branch of Rockhouse Fork, 1.9 miles north of Musick; Chilton Coal; elevation, 1395' B.

			Feet	Inches
Shale, sandy				
Coal	0'	11"		
Slate, dark	0	2		
Coal	2	4	3	5
Shale, gray				

The Chilton Coal has been prospected but little above Pigeon Creek in Lee District. The following exposure was observed by Gawthrop along Miller Creek:

Coal Exposure—No. 350 on Map II.

On Miller Creek, 4.3 miles east of Nolan; Chilton Coal; elevation, 965' B.

			Feet	Inches
Shale				
Coal, medium hard	0'	11"		
Shale, gray	0	9		
Coal, hard	1	4	3	0
Shale				

Prospect No. 351 on Map II, located on the head of Buffalo Creek, 3.4 miles northeast of Williamson, with a tidal elevation of 1130' B., was fallen shut when visited by Gawthrop, but the coal was reported about 5′ 6″ thick with a large shale parting.

Williamson, Magnolia and Stafford Districts Mingo County.

In **Williamson District,** no prospects were observed in the Chilton Coal, and its existence there in minable quantity is subject to doubt, as Map II shows its crop at a convenient height above drainage for prospecting.

In **Magnolia District,** the Chilton Coal is somewhat higher in the hills and little is known as to its extent or thickness. The following opening, examined by Gawthrop, is the only exposure of this coal noted in the district:

Coal Prospect—No. 352 on Map II.

On Nighway Branch of Pigeon Creek, 1.3 miles northwest of Calico; Chilton Coal; elevation, 1485′ B.

			Feet	Inches
Sandstone			10	0
Shale			4	0
Coal, cannel	1′	0″		
Coal, gas	0	2		
Slate, black	0	2		
Coal, gas	0	2		
Slate, black	0	2		
Coal	1	4	3	0
Shale				

In **Stafford District,** Map II shows the Chilton Coal horizon high in the hills in the western part and absent entirely in the eastern part. No prospects were observed.

Quantity of Chilton Coal Available.

The following estimate, based on the evidence of the preceding pages and on a planimetric determination by Gawthrop of the acreage from Map II, shows the amount of Chilton Coal estimated to be available. The amount already mined is such a small percentage of the total that it is disregarded in the estimate:

Probable Amount of Chilton Coal.

Counties by Districts	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville.......	....	......	....	....	....
Logan	4	184.84	118,298	20,612,243,520	824,489,740
Triadelphia	4	55.66	35,622	6 206,777,280	248,271,091
Totals		240.50	153,920	26,819,020,800	1,072,760,831
Mingo:					
Harvey	3	53.30	34,112	4,457,756,160	178,310,246
Warfield	3	28.10	17,984	2,350,149,120	94,005,965
Hardee	3	56.50	36,160	4,725,388,800	189,015,552
Lee	2	46.40	29,696	2,587,115,520	103,484,620
Williamson	2	0.88	563	49,048,560	1,961,943
Magnolia	2	24.50	15,680	1,366,041,600	54,641,664
Stafford	2	8.10	5,184	451,630,080	18 065,203
Totals		217.78	139,379	15,987,129,840	639,485,193
Totals for both Counties		458.28	293,299	42,806,150,640	1,712,246,024

THE DINGESS COAL.

The Dingess Coal, which has been mentioned and named on page 164, in Chapter VI, occurs at numerous localities throughout the two counties, but is of minable thickness and purity in only a few places. The seam often contains good coal, but is usually too thin for successful mining. It was once mined at Dingess, Harvey District, Mingo County, but the mines were abandoned for reasons unknown. Its outcrop is not shown on Map II, but the Dingess Limestone, just below it, is shown on this map in red ink, making it easy to locate the position of the coal. Figure 12 shows the regions where the Dingess Coal is known or believed to be of minable thickness and purity.

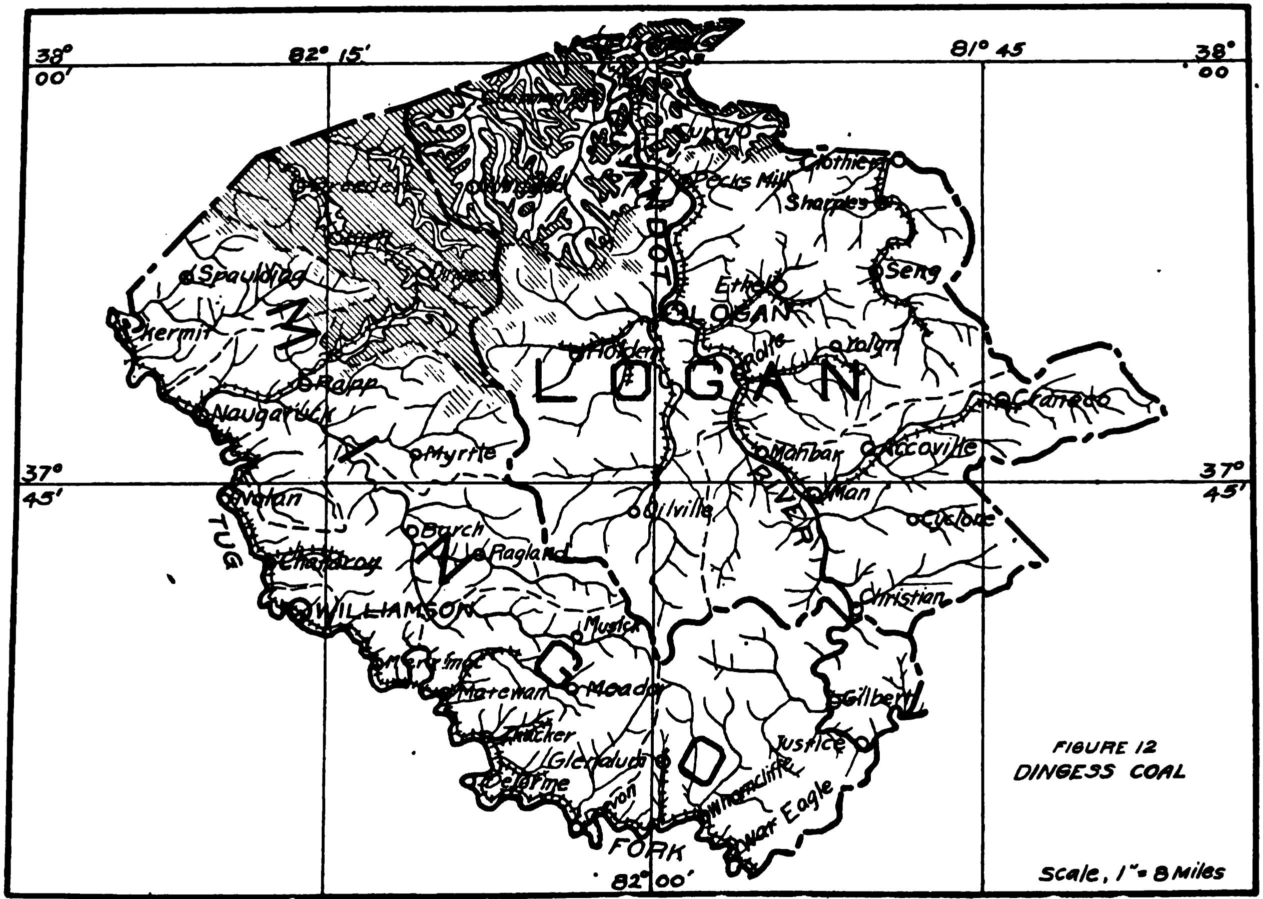

Figure 12. Showing Approximate Minable Area of Dingess Coa.l (See explanation in Authors' Preface).

Chapmanville District, Logan County.

In Chapmanville District, there is a considerable area of Dingess Coal, thick enough to be of economic value. It is doubtful whether commercial mining would be successful in this seam, but it furnishes valuable fuel for local domestic use.

In the western end of Chapmanville, the following exposure of the Dingess Coal was observed by Reger along the public highway:

Coal Exposure—No. 353 on Map II.

On Trace Fork of Hart Creek, 1.2 miles southeast of the corner of Logan, Mingo and Lincoln Counties; **Dingess Coal**; elevation, 740′ B.

			Feet	Inches
Sandstone, massive				
Coal	1′	0″		
Shale, gray	1	3		
Coal	0	2		
Shale, gray	0	3		
Coal	0	2		
Shale, gray	3	0		
Coal	0	8	6	6
Shale, dark			12	0
Limestone, ferriferous, in creek, Dingess			0	1

The following opening was examined by Reger in the same region:

Farm Mine—No. 354 on Map II.

On Adams Branch of Trace Fork of Hart Creek, 1.4 miles southeast of the corner of Logan, Mingo and Lincoln Counties; **Dingess Coal**; elevation, 750′ B.

			Feet	Inches
Sandstone, massive				
Coal	1′	2″		
Shale, gray	1	2		
Coal	1	2	3	6
Fire clay				

The following opening in the same region was observed by Reger and Gawthrop:

Anthony Adams Farm Mine—No. 355 on Map II.

On Hart Creek, at the mouth of Trace Fork, 2.7 miles north of Whirlwind; **Dingess Coal**; elevation, 770′ B.

			Feet	Inches
Sandstone, massive			10	0
Shale, silicious, with calamites and other plant fossils			3	0
Coal, semi-splint	0′	10″		
Shale, gray, with iron ore nodules	1	2		
Coal, reported	1	0	3	0
Fire clay				

The following opening was observed by Reger:

Coal Opening—No. 356 on Map II.

On Smokehouse Fork of Hart Creek, 2.2 miles S. 80° W. of Halcyon; **Dingess Coal**; elevation, 755′ B.

			Feet	Inches
Sandstone				
Shale			8	0
Coal, soft	1′	2″		
Slate, black	0	0½		
Coal, soft	0	7		
Coal, hard, semi-splint	0	11		
Shale, gray	0	11½		
Coal	1	2	4	10
Fire clay				

Another opening near by examined by Reger shows the following:

Harvey Dingess Farm Mine—No. 61 on Map II.

On Smokehouse Fork of Hart Creek, 2.2 miles S. 75° W. of Halcyon; **Dingess Coal**; elevation, 755′ B.

			Feet	Inches
1. Slate, black, with plant fossils				
2. Coal, soft	1′	2″		
3. Slate, black	0	2½		
4. Coal, medium hard	1	11		
5. Shale, gray	0	9		
6 Coal, medium hard	2	1	6	1½
7. Fire clay				

A sample for analysis was collected from Nos. 2, 4 and 6 of section, the composition of which is reported under Mine No.

61 in the table at the end of this Chapter. The analysis shows a coal high in volatile matter and low in sulphur and ash.

The following opening, examined by Reger, is on the same fork:

James Farley Farm Mine—No. 357 on Map II.

On Smokehouse Fork of Hart Creek, 1 mile southwest of Halcyon; Dingess Coal; elevation, 850' B.

			Feet	Inches
Shale, gray			5	0
Coal, semi-splint	0'	10"		
Coal, splint	1	8		
Shale, gray	0	3		
Coal	1	0	3	9
Shale, gray				

Just across the hill on another fork, the following opening was examined by Reger:

Lee Gore Farm Mine—No. 358 on Map II.

On Marsh Fork of Hart Creek, 0.5 mile southwest of Haleyon; Dingess Coal; elevation, 895' B.

			Feet	Inches
Sandstone				
Coal, soft	0'	10"		
Coal, splint	1	11		
Shale, with streaks of coal	0	8		
Coal, splint	1	8	5	1
Fire clay, visible			2	0

Farther down the same fork, the following opening was examined by Reger:

P. J. Dingess Farm Mine—No. 60 on Map II.

On Marsh Fork of Hart Creek, 0.8 mile north of Halcyon; Dingess Coal; elevation, 790' B.

				Feet	Inches
1.	Shale, gray			5	0
2.	Coal, soft	0'	7"		
3.	Coal, splint	1	7		
4.	Shale, gray	0	6		
5.	Coal	0	7	3	3
6.	Fire clay				

A sample was collected from Nos. 2 and 3 of section, the composition of which is published under Mine No. 60 in the table at the end of this Chapter.

The Dingess Coal has been mined by stripping on the head of Piney Fork of Hart Creek, where it is nearly two feet thick.

The following opening was examined by Reger:

George Simpkins Prospect—No. 359 on Map II.

On East Fork of Hart Creek, 0.9 mile northeast of Halycon; **Dingess Coal**; elevation, 860' B.

			Feet	Inches
Sandstone			3	0
Shale, gray			4	0
Coal, soft	0'	11"		
Slate, black, niggerhead, hard	0	1		
Coal, medium hard	1	7	2	7
Fire clay				

Another opening in the same coal, examined by Reger, on the same fork, shows the following:

Charles Lily Prospect—No. 360 on Map II.

On East Fork of Hart Creek, 1.5 miles east of Halcyon; **Dingess Coal**; elevation, 925' B.

			Feet	Inches
Sandstone				
Coal, soft	1'	3"		
Coal, splint	1	1		
Shale, gray	0	6		
Coal	0	2	3	0
Fire clay				

Logan District, Logan County.

In Logan District, the Dingess Coal has been prospected but little, so that its extent and character are still open to question, but the indications are that it is not usually of minable thickness.

It is noted in Coal Test Borings Nos. 79, 94, 98, and 102, published in this Chapter.

A prospect in the western part of the district, examined by Reger, shows the following:

Coal Prospect—No. 361 on Map II.

On the head of Dingess Fork of Copperas Mine Fork, 4 miles northwest of Holden; **Dingess Coal**; elevation, 1105′ B.

			Feet	Inches
Sandstone, massive			10	0
Concealed			7	0
Coal	0′	3″		
Slate, hard	0	1		
Coal	1	3	1	7
Sandstone, massive, to run			10	0

In the southwestern corner of Logan District, the Dingess Coal has been prospected along Cow Creek, one of these prospects, examined by Gawthrop, showing the following:

Coal Prospect—No. 362 on Map II.

On Left Fork of Cow Creek, 1.5 miles southwest of Oilville; **Dingess Coal**; elevation, 1215′ B.

			Feet	Inches
Sandstone, massive				
Shale			1	0
Coal, hard	1′	0″		
Coal, slaty	0	2		
Shale	0	2		
Coal, hard	0	4	1	8
Shale				

Another prospect on the same creek shows the following, according to Gawthrop:

Coal Prospect—No. 363 on Map II.

On Cow Creek, 1.5 miles southwest of Oilville; **Dingess Coal**; elevation, 1160′ B.

			Feet	Inches
Sandstone, shaly				
Shale, gray			2	0
Coal, cannel	0′	6″		
Coal, hard	0	4		
Shale	0	4		
Coal, medium hard	1	3	2	5

Triadelphia District, Logan County.

In Triadelphia District, little is known regarding the Dingess Coal. One prospect, examined by Gawthrop, was found in the district, as follows:

Coal Prospect—No. 364 on Map II.

On Right Fork of Buffalo Creek, 1.6 miles S. 15° W. of Craneco; **Dingess Coal**; elevation, 1580′ B.

			Feet	Inches
Shale, dark gray, sandy				
Slate			0	1
Coal	0′	10″		
Slate	0	2		
Shale, very sandy	8	0		
Coal, hard	1	4	10	4
Shale, sandy				

Harvey District, Mingo County.

In Harvey District, the Dingess Coal is of wide distribution and good quality, but is usually too thin for mining in commercial competition against operations in the thicker seams of the Kanawha Series. It has been opened frequently for local domestic fuel and gives good satisfaction.

In Chapter IV, the coal is noted in the sections for Breeden, Dingess and Hale, and in Chapter VI, it is recorded in the section for Dingess Trace Branch.

In the northern part of Harvey District, the coal comes above drainage on East Fork of Twelvepole at McCloud, where the following opening was examined by Reger:

Coal Stripping—No. 365 on Map II.

On East Fork of Twelvepole Creek, 0.2 mile south of McCloud; **Dingess Coal**; elevation, 855′ B.

			Feet	Inches
Coal	0′	4″		
Shale, gray	1	2		
Coal, visible	2	0	3	6
Concealed by water				

The following is another opening examined by Reger:

Coal Prospect—No. 366 on Map II.

On Hogger Branch of East Fork of Twelvepole Creek, 1 mile southeast of McCloud; **Dingess Coal**; elevation, 895′ B.

			Feet	Inches
Sandstone, flaggy			10	0
Shale, silicious			3	0
Coal	0′	6″		
Shale, gray	0	7		
Coal	1	9	2	10
Concealed				

There can be no doubt as to the identification of this coal along Twelvepole as the fossiliferous Dingess Limestone was found by Reger along the highway about one-third mile west of this opening and at an elevation of 880′ B.

The following is another opening examined by Reger:

Guyandot Land Association Prospect—No. 367 on Map II.

On Bills Branch of East Fork of Twelvepole Creek, 1.2 miles S. 15° E. of McCloud; **Dingess Coal**; elevation, 925′ B.

			Feet	Inches
Sandstone, massive			10	0
Shale, sandy			3	0
Coal	0′	6″		
Shale, gray	0	2		
Coal	2	0	2	8
Concealed				

The following opening was examined by Reger in the same region:

Guyandot Land Association Prospect—No. 368 on Map II.

On a branch of East Fork of Twelvepole Creek, 1.5 miles southeast of McCloud; **Dingess Coal**; elevation, 955′ B.

			Feet	Inches
Coal	0′	6″		
Shale, gray	0	5		
Coal, semi-splint	1	5	2	4
Fire clay				

Another opening shows the following, according to Reger:

Lewis McCloud Prospect—No. 369 on Map II.

On East Fork of Twelvepole Creek, 2 miles S. 15° E. of McCloud; **Dingess Coal**; elevation, 950′ B.

			Feet	Inches
Sandstone, flaggy				
Shale, gray			0	6
Coal, medium hard	0′	7″		
Slate, black, 1″ to	0	2		
Coal, semi-splint	2	5	3	2
Fire clay				

Another opening shows the following, according to Reger:

Coal Prospect—No. 370 on Map II.

On a branch of East Fork of Twelvepole Creek, 2.5 miles southeast of McCloud; **Dingess Coal**; elevation, 1000′ B.

			Feet	Inches
Shale, brown				
Coal	0′	9″		
Slate, black	0	1		
Coal	1	11	2	9
Fire clay				

Another opening, examined by Reger, shows the following:

Coal Prospect—No. 371 on Map II.

On a branch of East Fork of Twelvepole Creek, 2 miles north of Dingess; **Dingess Coal**; elevation, 975′ B.

			Feet	Inches
Shale, silicious, with iron ore nuggets			10	0
Coal, medium hard	0′	7″		
Slate, black	0	1		
Coal, medium hard	1	6	2	2

Another opening, examined by Reger and Gawthrop, shows the following:

Coal Prospect—No. 372 on Map II.

On East Fork of Twelvepole Creek, 1.6 miles northeast of Dingess; **Dingess Coal**; elevation, 1005′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal	0′	11½″		
Shale, gray	0	1		
Coal	0	5½		
Slate	0	0¼		
Coal, splint	1	3	2	9¼

Another opening, examined by Reger, shows the following:

Coal Prospect—No. 373 on Map II.

On East Fork of Twelvepole Creek, 2 miles northeast of Dingess; **Dingess Coal**; elevation, 1035′ B.

			Feet.	Inches
Shale, gray			3	0
Coal	1′	1″		
Slate, black	0	2		
Coal	1	5	2	8
Concealed by water				

Another opening, farther up the creek, shows the following, according to Reger:

Coal Prospect—No. 374 on Map II.

At Blair Fork on East Fork of Twelvepole Creek, 2.5 miles northeast of Dingess; **Dingess Coal**; elevation, 1065′ B.

			Feet.	Inches
Coal	3′	0″		
Slate gray	0	1		
Coal	0	4	3	5
Fire clay			1	0
Sandstone, massive			3	0
Shale, sandy			20	0
Limestone, silicious, Dingess			1	0

Another opening, examined by Reger, shows the following:

Guyandot Land Association Prospect—No. 375 on Map II.

On the head of Blair Fork of Twelvepole Creek, 3.2 miles northeast of Dingess; **Dingess Coal**; elevation, 1120′ B.

			Feet.	Inches
Sandstone, massive				
Coal, splinty	0′	9½″		
Slate, black	0	0½		
Coal, splinty	2	2	3	0
Shale, gray				

On West Fork of Twelvepole Creek, the Dingess Coal was noted frequently along the Norfolk and Western Railway cuts by Reger, but west of the mouth of Dingess Trace Branch, it was not found in minable thickness. At Breeden, where the Dingess Limestone, with marine fossils, crops in Breeden Creek near its mouth, leaving no doubt as to the correlation of of the strata, the Dingess Coal above it is split into two benches too thin for mining.

Above Dingess Trace Branch, the coal again reaches commercial thickness. The following opening was examined by Reger and Gawthrop:

Guyandot Land Association Farm Mine—No. 62 on Map II.

On West Fork of Twelvepole Creek, 0.7 mile northwest of Dingess; Dingess Coal; elevation, 965′ B.

				Feet.	Inches
1.	Sandstone, massive				
2.	Coal, semi-splint	1′	1″		
3.	Slate, black	0	1		
4.	Coal, semi-splint	0	5		
5.	Slate, black	0	0½		
6.	Coal, splint	1	0½	2	8
7.	Fire clay				

A sample was collected from Nos. 2, 4 and 6 of section, the composition of which is published under Mine No. 62 in the table at the end of this Chapter. The analysis shows it high in sulphur, but good steam coal.

The following opening, examined by Reger and Gawthrop, shows the following:

Coal Prospect—No. 376 on Map II.

On West Fork of Twelvepole Creek, 0.2 mile northwest of Dingess; Dingess Coal; elevation, 985′ B.

			Feet.	Inches
Sandstone, massive				
Shale, gray, silicious			6	0
Coal, medium hard	1′	3″		
Slate, black	0	2		
Coal, semi-splint	1	8	3	1
Concealed				

Mining operations were once started in the Dingess Coal by the Mingo Block Coal Company at Dingess, but the mines have been abandoned and completely dismantled. The Dingess Mine, which had several openings, was located near the axis of the Warfield Anticline, making it necessary to mine directly on the dip. The east entry was driven parallel to Twelvepole Creek, and, according to miners who worked in the coal, soon encountered the Warfield Fault. From the description given by these men, it seems certain that the breaks found in this mine were secondary disturbances, as the main fault line is several hundred feet east of this end of this entry. An offset of 4 feet was reported.

A measurement made by Hennen and Reger in this entry, as far down the slope as it was possible to go on account of water, shows the following:

Mingo Block Coal Co., East Entry of Dingess Mine (Abandoned)—No. 377 on Map II.

On West Fork of Twelvepole Creek, 0.4 mile east of Dingess; Dingess Coal; elevation, 980′ B.

			Feet.	Inches
Sandstone				
Draw slate			1	0
Coal, gas	1′	3½″		
Bone	0	1½		
Coal, splinty	1	8	3	1
Shale				

Another entry of this mine shows the following, according to Hennen:

Mingo Block Coal Co., North Entry, Dingess Mine (Abandoned)—No. 378 on Map II.

On West Fork of Twelvepole Creek, 0.3 mile east of Dingess; Dingess Coal; elevation, 1015′ B.

			Feet.	Inches
Sandstone, massive, Dingess			20	0
Shale			0	8
Coal	1′	3½″		
Bone	0	1		
Coal, splinty	1	5	2	9½
Fire clay			3	0
Sandstone, massive, to creek			35	0

A prospect just across Twelvepole Creek shows the following, according to Reger and Gawthrop:

Mingo Block Coal Co. Prospect—No. 379 on Map II.

On West Fork of Twelvepole Creek, 0.3 mile southeast of Dingess; **Dingess Coal**; elevation, 1000′ B.

			Feet.	Inches
Sandstone, massive				
Shale, silicious, 6″ to			1	0
Coal, medium hard	1′	6″		
Slate, black	0	1½		
Coal, medium hard	1	1		
Slate, black	0	0½		
Coal	0	6	3	3
Fire clay				

The following exposure was examined by Reger and Gawthrop, east of the Warfield Fault:

Mingo Block Coal Co. Prospect—No. 380 on Map II.

On West Fork of Twelvepole Creek at the mouth of Moses Fork, 1.3 miles southeast of Dingess; **Dingess Coal**; elevation, 1038′ L.

			Feet.	Inches
Sandstone, shaly			30	0
Shale, gray, 0′ to			3	0
Coal	0′	8″		
Shale, gray	0	2		
Coal	0	4		
Shale, gray	4	0		
Coal, semi-splint	2	11	8	1
Fire clay				

The Dingess Coal was formerly mined on Laurel Fork near the abandoned town of Prendergast, on the land of the Mingo Block Coal Company, but the mine has been abandoned and dismantled. This mine was once examined and sampled by Hennen and the following results were pubiished by I. C. White in Volume II(A), page 406, of the State Survey Reports, under the name of the **Alma Coal**, but it proves to be the **Dingess**:

Marion Timbering Co. Mine (Abandoned)—No. 62A on Map II.

On Laurel Fork of Pigeon Creek, 0.7 mile northeast of Hale; **Dingess Coal**; elevation, 905′ B.

	Feet.	Inches
1. Slate, good		
2. Fire clay. soft, draw slate	0	3

			Feet	Inches
3. Coal, gas	0'	3"		
4. Bone	0	1		
5. Coal, gas	1	2		
6. Coal, semi-splint	0	9		
7. Coal, gas	0	11	3	2

"Greatest rise, S. 40° E.; used for local purposes; authority for mine data. H. M. Payne, General Superintendent; sample from Nos. 3, 5, 6, and 7 for analysis."

The composition of this sample is published under Mine No. 62A in the table at the end of this Chapter.

The analysis shows a good quality of coal, low in sulphur and phosphorus.

The following prospect was examined by Reger farther up Laurel Fork:

Mingo Block Coal Co. Prospect—No. 381 on Map II.

On Laurel Fork of Pigeon Creek, 1.1 miles northeast of Hale; **Dingess Coal**; elevation, 950′ B.

			Feet	Inches
Sandstone				
Shale, gray			1	6
Coal	0'	2"		
Slate, black	0	1		
Coal, semi-splint	0	11		
Coal, splint	1	0	2	2
Sandstone, massive			20	0
Shale, gray, sandy, and concealed			30	0
Limestone, in creek, fossiliferous, **Dingess**				

Another prospect on the same stream shows the following, according to Reger:

Mingo Block Coal Co. Prospect—No. 382 on Map II.

On Laurel Fork of Pigeon Creek, 1.8 miles east of Hale; **Dingess Coal**; elevation, 960′ B.

			Feet	Inches
Coal	2'	0"		
Shale, gray	7	0		
Coal	0	3		
Slate, black	0	1		
Coal, semi-splint	0	11		
Coal, splint	1	4	11	7
Fire clay				

The following exposure was examined by Hennen along the N. & W. Ry. grade:

N. & W. Ry. Cut—No. 383 on Map II.

On Laurel Fork of Pigeon Creek, at Hale; **Dingess Coal**; elevation, 910′ B.

			Feet	Inches
Sandstone, massive			35	0
Coal	0′	10″		
Slate, dark, with coal streaks	1	3		
Coal, slaty	0	4		
Shale, gray	2	6		
Coal, splint	0	8	5	7
Sandstone, shaly, to grade				

Another exposure, examined by Hennen, shows the following:

N. & W. Ry. Cut—No. 384 on Map II.

On Laurel Fork of Pigeon Creek, at the mouth of Laurel Branch, 0.3 mile west of Hale; **Dingess Coal**; elevation, 895′ B.

			Feet	Inches
Sandstone, massive			15	0
Coal	0′	5″		
Shale, gray, sandy	3	0		
Coal	0	3		
Shale, dark	1	0		
Coal	0	2		
Shale, gray	1	3		
Coal, splint	0	6		
Shale, dark, with sandstone	10	0		
Coal	1	1	17	8

These last two exposures show the coal to be too much split with shale partings to be of value. The coal is in much the same condition all the way down Laurel Fork and Pigeon Creek to its mouth at Naugatuck.

Warfield District, Mingo County.

In Warfield District, only a few exposures of the Dingess Coal were observed, although its horizon is above drainage along the Warfield Anticline. It may be disregarded as a commercial asset of this district.

The following is the only opening of minable thickness observed in the district, according to Reger:

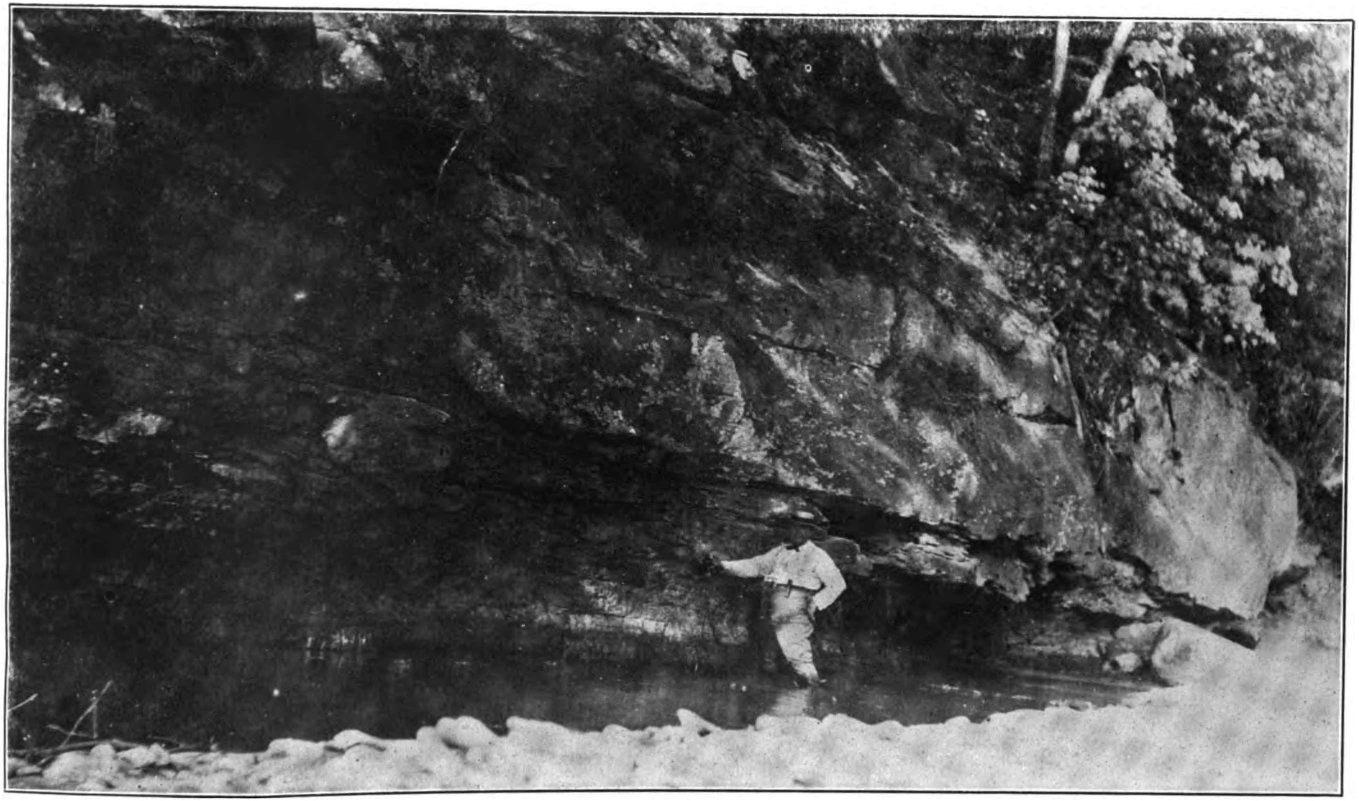

PLATE XI.—Showing Campbell Creek (No. 2 Gas) Coal passing below Buffalo Creek and overlying Peerless Sandstone, just west of Craneco, Logan County.

Columbus Wiles Farm Mine—No. 385 on Map II.

On Left Fork of Marrowbone Creek, 0.2 mile north of Spaulding; Dingess Coal; elevation, 815′ B.

			Feet	Inches
Sandstone, shaly				
Shale, gray			2	0
Coal	0′	8″		
Shale, gray	0	8		
Coal, splint	2	2	3	6
Fire clay				

Another opening on the same branch shows the following, according to Reger:

Wm. Brewer Prospect—No. 386 on Map II.

On Left Fork of Marrowbone Creek, 0.6 mile northeast of Spaulding; Dingess Coal; elevation, 820′ B.

			Feet	Inches
Sandstone, massive				
Shale, gray			4	0
Coal	0′	8″		
Shale, gray	0	6		
Coal	0	8	1	10
Shale, gray, concealed, and dark shale			20	0
Limestone, hard. Dingess			0	6

Hardee District, Mingo County.

In Hardee District, the Dingess Coal is not of sufficient thickness and purity to be commercially minable, but it has been frequently opened along the creeks for local use.

In Chapter IV, the Dingess Coal is noted in the geologic section for Naugatuck, where it is split into two separate benches, 14 feet apart.

The lower bench of the coal is exposed along the railroad near Naugatuck, where Hennen made the following section:

N. & W. Ry. Cut—No. 387 on Map II.

On Tug Fork at the mouth of Pigeon Creek, at Naugatuck; Dingess Coal; elevation, 648′ L.

			Feet	Inches
Sandstone, shaly at top, massive at bottom			10	0
Shale, gray			3	0
Coal, splint	0′	9″		
Slate, gray	0	0½		
Coal, splint	1	1	1	10½
Concealed to railroad grade			5	0

The following exposure was examined by Reger along the railroad farther east:

N. & W. Ry. Cut—No. 388 on Map II.

On Pigeon Creek, 0.3 mile northeast of Naugatuck; **Dingess Coal**; elevation, 657′ B.

			Feet	Inches
Sandstone, massive				
Coal, thickness concealed, Dingess, Upper Bench				
Concealed			5	0
Sandstone, shaly			15	0
Coal	0′	8″		
Slate, gray	0	1		
Coal	1	0	1	9
Fire clay and shale to railroad grade			20	0

The following opening was examined by Reger farther east:

Coal Prospect—No. 389 on Map II.

On Right Fork of Laurel Fork, 0.6 mile southeast of Rapp; **Dingess Coal**; elevation, 660′ B.

				Feet	Inches
Sandstone, massive					
Coal	0′	6½″			
Slate	0	0½			
Coal	0	9½			
Slate, gray	0	1			
Coal	0	6½			
Slate, dark	0	2			
Coal	0	5		2	7
Shale, gray, and concealed				5	0
Shale, gray, sandy, with marine fossils	3′	0″	**Dingess Limestone**	4	0
Sandstone, massive, with marine fossils	1	0			
Shale, gray, with iron ore, to creek				3	0

An opening examined by Reger farther up the same fork shows the following:

Coal Prospect—No. 390 on Map II.

On Right Fork of Laurel Fork, 1.6 miles S. 75° E. of Rapp; Dingess Coal; elevation, 700′ B.

			Feet	Inches
Sandstone, massive				
Shale			1	0
Coal	0′	7″		
Slate, gray	0	1½		
Coal	0	9½		
Shale, gray	0	3		
Coal, splint	0	9		
Slate, black	0	1		
Coal	0	4	2	11
Fire clay and sandy shale			10	0
Sandstone, hard, fossiliferous, to creek, Dingess Limestone			1	0

The following is another exposure of the coal examined by Reger farther east:

Coal Prospect—No. 391 on Map II.

On Right Fork of Laurel Fork at the mouth of Rockhouse Branch, 2 miles east of Rapp; Dingess Coal; elevation, 709′ L.

			Feet	Inches
Sandstone, massive				
Shale, gray			4	0
Coal	0′	9″		
Slate	0	1		
Coal	0	9		
Shale, gray	0	8		
Coal, splint	0	8		
Slate, black	0	1		
Coal	0	4	3	4
Fire clay to creek			1	0

The following is another opening examined by Reger farther north:

Coal Prospect—No. 392 on Map II.

On Coal Spring Fork of Laurel Fork, 0.6 mile N. 15° W. of Canterbury; Dingess Coal; elevation, 780′ B.

	Feet	Inches
Sandstone, massive		
Coal	2	4
Shale		

The Dingess Fossiliferous Limestone crops 25′ below this coal a short distance down the fork, but the coal is not so thick as at the prospect given above.

The following prospect was examined by Reger on main Pigeon Creek:

Coal Prospect—No. 393 on Map II.

On Pigeon Creek, 1.5 miles southeast of Lenore; **Dingess Coal**; elevation, 700′ B.

			Feet	Inches
Sandstone, shaly				
Shale, gray			1	0
Coal	0′	0½″		
Slate, dark	0	3		
Coal	0	6		
Slate, black	0	3		
Coal	1	4	2	4½
Fire clay and concealed to Dingess Limestone			20	0

The Dingess Coal is exposed at a few places along the Norfolk & Western Railway between Naugatuck and the Lee District Line, but, according to Hennen, it is too thin to be of economic importance.

Lee, Williamson, Magnolia and Stafford Districts, Mingo County.

In **Lee District,** the Dingess Coal is not thought to be of commercial importance. Only a few openings were observed and these were thin or slaty. In Chapter IV, it is noted in the section for Chattaroy, where there are only 9 inches of coal.

In **Williamson District,** the Dingess Coal was not observed and it is probably too thin to be minable.

In **Magnolia District,** few exposures were found, but these indicate more coal than in Lee. The two following openings are reported by Gawthrop:

Coal Exposure—No. 394 on Map II.

Along Pigeon Creek, 0.3 mile northwest of Calico; **Dingess Coal**; elevation, 1420′ B.

			Feet	Inches
Shale, gray			4	0
Coal	0′	1″		
Shale	1	6		
Coal, gas	0	5		
Shale	1	0		
Coal, slaty	0	10		
Shale	0	9		
Coal	0	9	5	4
Shale				

Coal Prospect—No. 395 on Map II.

On Munsey Branch of Pigeon Creek, 1.4 miles west of Calico; Dingess Coal; elevation, 1365′ B.

			Feet	Inches
Shale, dark gray, silicious			10	0
Coal, gas	0′	5″		
Slate, black	0	1		
Coal	0	1		
Slate	0	2		
Coal	0	6		
Slate	0	1		
Coal	0	5	1	9
Shale and concealed to branch			3	0

In **Stafford District**, the Dingess Coal is well up in the hills and little information is available concerning it. The only place where it was observed was at Browning Fork of Horsepen, where it was once prospected by John Hunter and is reported 2′ 1″ thick in the section for that place, published in Chapter VI.

Quantity of Dingess Coal Available.

Based on the evidence of the preceding pages and a planimetric determination from Map II by Gawthrop, using the outcrop of the Dingess Limestone and making a slight deduction for the smaller area of coal, the following estimate is made of the probable amount of the Dingess Coal:

Probable Amount of Dingess Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville.....	2	36.00	23,040	2,007,244,800	80,289,792
Logan	1	197.00	126,080	5,492,044,800	219,681,792
Triadelphia.......	1	66.00	42,240	1,839,974,400	73,598,976
Totals.........		299.00	191,360	9,339,264,000	373,570,560
Mingo:					
Harvey	2	59.00	37,760	3,289,651,200	131,586,048
Warfield		......	....	....	....
Hardee	1	64.00	40,960	1,784,217,600	71,368,704
Lee		......	....	....	....
Williamson		......	....	....	....
Magnolia	1	33.50	21,440	933,926,400	37,357,056
Stafford	1	13.00	8,320	362,419,200	14,496,768
Totals.........		169.50	108,480	6,370,214,400	254,808,576
Totals for Both Counties.....		468.50	299,840	15,709,478,400	628,379,136

THE WILLIAMSON COAL.

The Williamson Coal, which has been described briefly in Chapter VI, page 166, is of widespread occurrence throughout the two counties, but is usually too slaty or too thin for commercial mining. In Lee, Williamson, and Magnolia Districts, Mingo County, however, it reaches its best development and is mined at several points with good results.

The outcrop of the coal is not shown on Map II, but it lies just below the Dingess Limestone, which is shown in **red**, and may be located from the crop line of that horizon. Figure 13 shows the region where it is known or believed to be of minable thickness and purity.

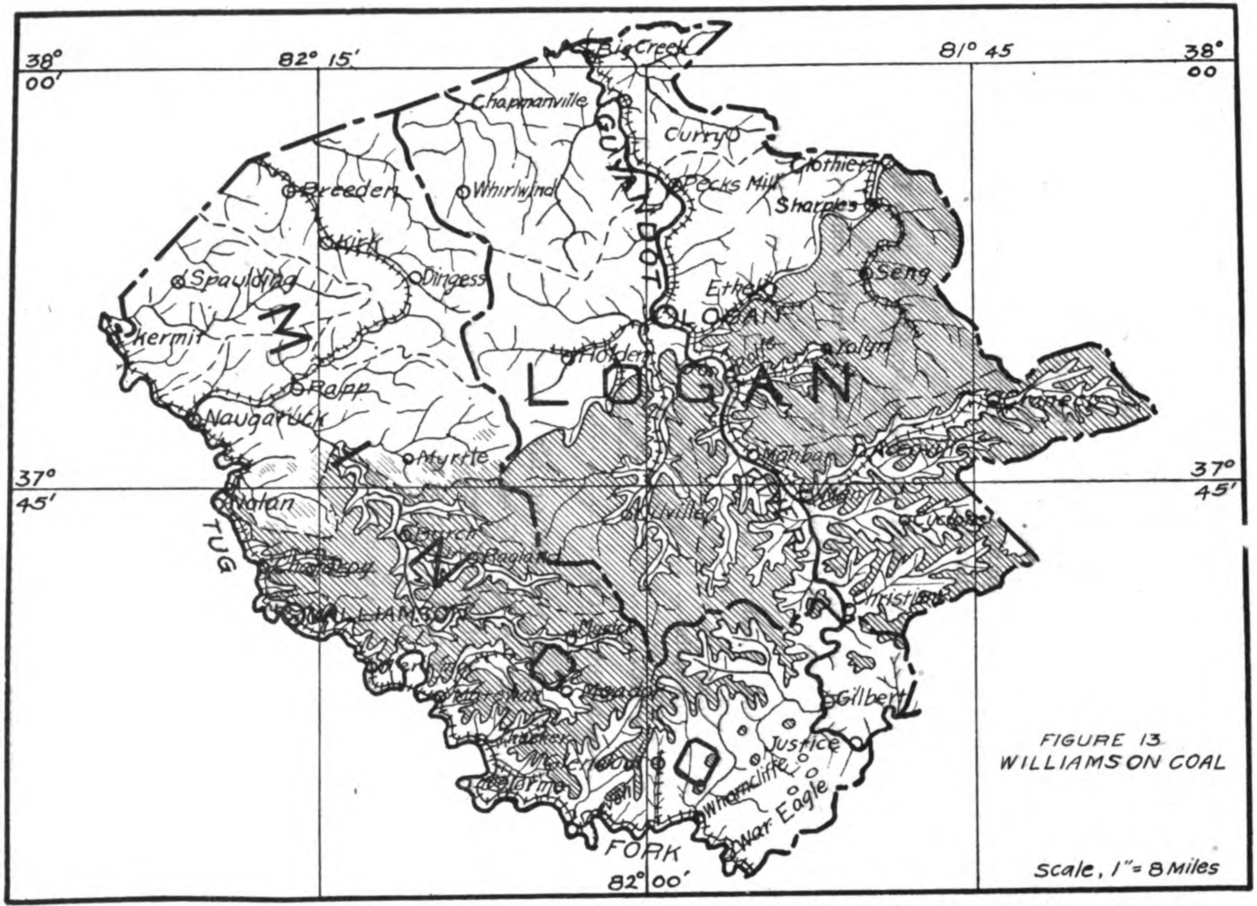

Figure 13. Showing Approximate Minable Area of Williamson Coal. (See explanation in Authors' Preface).

Chapmanville District, Logan County.

In Chapmanville District, the Williamson Coal is not important. It is seldom found in the measures and is then too thin or too slaty to be minable.

In Chapter IV, it is noted in the section for Big Creek, and in Chapter VI, it is noted in that for Chapman Branch.

The following opening was examined by Gawthrop in the northern end of the district:

Wm. Abbott Coal Opening—No. 396 on Map II.

On Abbott Branch of Guyandot River, 1.7 miles southwest of Big Creek; Williamson Coal; elevation, 770′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	0′	3½″		
Slate, black	0	0½		
Coal, semi-splint	1	0		
Shale, gray	1	10		
Coal, splint	0	10	4	0
Concealed by water				

At **Prospect No. 397 on Map II,** examined by Gawthrop on Piney Fork of Hart Creek, 0.9 mile northwest of Halcyon, at an elevation of 745′ B., residents reported 4′ 8″ of solid coal, but it is likely that partings would be found here as at other points in the Guyandot Valley.

The following exposure was observed by Gawthrop in the same region:

Coal Exposure—No. 398 on Map II.

Along Hoover Fork of Hart Creek, 2.3 miles northwest of Whirlwind; Williamson Coal; elevation, 785′ B.

			Feet	Inches
Shale, gray			12	0
Coal, soft	0′	3″		
Shale	0	10		
Coal	1	3	2	4
Concealed				

Logan District, Logan County.

In Logan District, the Williamson Coal is more frequently found than in Chapmanville, but it contains too much slate and shale to be successfully mined.

In Chapter IV, it is noted in the section for Clothier, and in Chapter VI it is recorded in those for Holden, Whitman, Zinn Branch and Laurel Fork of Pine Creek. In this Chapter, it is noted in Coal Test Borings Nos. 50, 55, 58, 64, 77, 93, 94, 95, 98, 99, and 101.

The following opening was examined by Gawthrop in the northern part of Logan District:

Coal Opening—No. 399 on Map II.

On Hewett Creek, 1.3 miles northwest of Lake; Williamson Coal; elevation, 1290′ B.

			Feet	Inches
Sandstone, massive, visible			6	0
Coal, gas	0′	2″		
Slate, black	0	1		
Coal, gas	0	4		
Slate	0	0¼		
Coal, semi-splint	0	6		
Coal, splint	1	0	2	1¼
Slate, black, hard				

Another opening farther south, examined by Gawthrop, shows the following:

Coal Opening—No. 400 on Map II.

On Sycamore Branch of Hewett Creek, 1.2 miles S. 15° W. of Lake; Williamson Coal; elevation, 1160′ B.

			Feet	Inches
Shale, gray, silicious				
Coal, soft	0′	6″		
Coal, harder	0	5		
Slate, black	0	3		
Coal, visible	1	5	2	7

The following opening was examined by Hennen:

Coal Opening—No. 401 on Map II.

On Dingess Run, 0.4 mile northeast of Fort Branch; Williamson Coal; elevation, 765′ B.

			Feet	Inches
Sandstone, shaly			15	0
Coal, splinty	0′	5″		
Coal, slaty	0	4		
Slate, black	0	1		
Coal, slaty	0	3		
Shale, gray	0	2		
Coal	0	3	1	6
Fire clay shale				

Another opening, examined by Hennen in the same region, shows the following:

Coal Opening—No. 402 on Map II.

On a short branch of Guyandot River, 0.5 mile west of McConnell; Williamson Coal; elevation, 760′ B.

			Feet	Inches
Sandstone			5	0
Coal, gas	0′	10″		
Slate, dark gray	0	1		
Coal, gas	1	5	2	4
Fire clay				

The following exposure was noted by Reger farther west, measurements being made by hand level:

Coal Exposure—No. 403 on Map II.

On Copperas Mine Fork, at the southwest edge of Holden; Williamson Coal; elevation, 826′ L.

				Feet	Inches
Shale, sandy				5	0
Sandstone, ferriferous, with marine fossils, Dingess Limestone				0	6
Sandstone, hard				1	0
Shale, sandy				15	0
Sandstone, shaly				2	0
Coal	0′	11″	Williamson	5	8
Shale, gray	0	11			
Sandstone, lenticular, 0′ to	2	0			
Coal	1	10			
Fire clay and shale				5	6
Sandstone, massive, Upper Cedar Grove				31	0
Shale, gray, sandy, to mouth of well No. 90				34	0

Another exposure, examined by Reger farther up the same stream, shows the following:

Coal Prospect—No. 404 on Map II.

On Copperas Mine Fork, 3.8 miles west of Holden; Williamson Coal; elevation, 970′ B.

			Feet.	Inches
Steep bluff, mostly sandstone			100	0
Shale, gray			1	0
Coal	1′	0″		
Slate	0	1		
Coal	0	1		
Slate	0	5		
Coal, slaty	0	10	2	5
Fire clay in creek				

The following exposure was noted by Reger along a creek bluff:

Coal Exposure—No. 404A on Map II.

On Whitman Creek, 0.7 mile south of Holden; Williamson Coal; elevation, 780′ B.

			Feet.	Inches
Shale, sandy			35	0
Limestone, hard, Dingess			1	0
Shale, sandy			15	0
Coal	0′	6″		
Shale	1	0		
Coal	2	0	3	6
Shale, sandy, to creek			25	0

The two following prospects were examined by Reger on Island Creek above Logan. There can be no doubt as to the identification of the coal as the Zinn Branch Section, published in Chapter VI, shows a hand-level measurement of 27 feet from this same coal up to the fossiliferous Dingess Limestone, made at the mouth of the branch a short distance below the coal prospects:

Coal Prospect—No. 405 on Map II.

On Zinn Branch of Island Creek, 1.8 miles southeast of Monaville; Williamson Coal; elevation, 800′ B.

			Feet.	Inches
Shale, sandy				
Coal	0′	5″		
Shale	0	5		
Coal	0	6		
Shale	0	8		
Coal	0	11½		
Slate, black	0	0½		
Coal	1	5	4	5
Sandstone, to run			40	0

Coal Prospect—No. 406 on Map II.

On Zinn Branch of Island Creek, 1.9 miles southeast of Monaville; Williamson Coal; elevation, 790′ B.

			Feet.	Inches
Shale, sandy				
Coal	0′	5″		
Shale	0	7		
Coal	0	11		
Shale	0	8		
Coal	0	11½		
Slate, black	0	0½		
Coal	1	9	5	4
Concealed				

The following exposure was noted along a creek farther south by Reger:

Coal Exposure—No. 407 on Map II.

Along Pine Creek, 1.8 miles N. 10° W. of Oilville; Williamson Coal; elevation, 910′ B.

			Feet.	Inches
Sandstone				
Coal	0′	10″		
Slate, black	0	1		
Coal	1	8	2	7
Shale, gray			2	0
Sandstone, massive, to creek			5	0

The two following prospects were examined by Hennen on a branch farther south:

Coal Opening—No. 408 on Map II.

On Conley Branch of Island Creek, 3.7 miles southeast of Oilville; Williamson Coal (Upper Bench); elevation, 1305′ B.

			Feet.	Inches
Sandstone, massive			15	0
Shale, sandy			3	0
Coal, gas	0′	11″		
Bone	0	1½		
Coal, gas	1	10½	2	11
Fire clay				

Coal Prospect—No. 63 on Map II.

On Conley Branch of Island Creek, 4 miles southeast of Oilville; **Williamson Coal** (Lower Bench); elevation, 1315' B.

				Feet.	Inches
1.	Coal, Upper Bench				
2.	Concealed, about			10	0
3.	Shale, sandy			5	0
4.	Slate, coaly	0'	2"		
5.	Shale, gray	1	4		
6.	Coal, hard	0	11		
7.	Bony splint	0	1		
8.	Coal, hard	2	7	5	1
9.	Concealed				

A sample was collected from Nos. 6, 7 and 8 of section, the composition of which is published under Mine No. 63 in the table at the end of this Chapter. The analysis shows a good coal, low in ash, sulphur and phosphorus.

Two other openings, examined by Hennen, farther south, show the following:

Coal Exposure—No. 409 on Map II.

On Island Creek, 2.7 miles north of Calico; **Williamson Coal**; elevation, 1260' B.

			Feet.	Inches
Sandstone, massive, yellowish gray, coarse			15	0
Coal, gas, hard	0'	6"		
Bone	0	1		
Coal, gas	2	2	2	9
Slate				

Coal Opening—No. 410 on Map II.

On Island Creek, 2.5 miles north of Calico; **Williamson Coal**; elevation, 1270' B.

			Feet.	Inches
Sandstone, massive, yellowish gray			30	0
Coal, gas, hard	0'	7"		
Bone	0	1		
Coal, gas, hard	2	1	2	9
Slate				

Triadelphia District, Logan County.

In Triadelphia District, the Williamson Coal has much the same character as in Logan, being frequently too much split with shale to be successfully mined.

In Chapter VI, the coal is noted in the section for Robinette, where it is 2′ 11″ thick.

The following prospect was examined by Gawthrop:

Thos. N. Perry Prospect—No. 411 on Map II.

On Right Fork of Buffalo Creek, 1.8 miles southwest of Craneco; Williamson Coal; elevation, 1545′ B.

			Feet.	Inches
Shale				
Coal, gas	1′	3″		
Slate	0	0¼		
Coal	0	2		
Bone	0	1¾		
Coal	0	3		
Shale, gray, hard	1	8		
Coal, gas	0	10		
Shale, gray	1	0		
Coal, slaty	0	2		
Coal	0	4		
Bone	0	1		
Coal, hard	1	2		
Sulphur bone	0	1		
Coal	0	5		7	7
Slate				

The following exposure of the coal was noted by Hennen:

Coal Exposure—No. 412 on Map II.

On Buffalo Creek, 0.5 mile N. 80° E. of Craneco; Williamson Coal; elevation, 1675′ B.

	Feet.	Inches
Sandstone		
Shale, dark	15	0
Limestone, Dingess	0	6
Shale, dark	15	0
Coal	1	2
Shale, gray	2	0
Concealed to bed of Buffalo Creek	3	0

The following opening was examined by Hennen on a branch of Buffalo Creek:

Coal Opening—No. 413 on Map II.

On Rich Creek, 5.2 miles southwest of Man; Williamson Coal; elevation, 1350′ B.

			Feet.	Inches
Shale, sandy, dark, with fossil plants			7	0
Coal	0′	1⅛″		
Coal, splint	2	0		
Coal, slaty	0	4	2	5⅛
Fire clay				

Another opening, examined by Hennen farther up the same creek, shows the following:

Coal Opening—No. 414 on Map II.

On Rich Creek, 5.3 miles southwest of Man; Williamson Coal; elevation, 1370′ B.

			Feet.	Inches
Sandstone, massive			5	0
Shale, sandy			4	6
Coal, gas	1′	0″		
Bone	0	1½		
Coal, splinty	1	10	2	11½
Slate				

Another opening, examined by Hennen farther up the creek, shows the following:

Coal Opening—No. 415 on Map II.

On Rich Creek, 5.4 miles southwest of Man; Williamson Coal; elevation, 1395′ B.

			Feet.	Inches
Sandstone			3	0
Shale, sandy, with fossil plants			7	0
Coal, gas	1′	0″		
Bone	0	1		
Coal, splinty, block	1	10	2	11

Harvey District, Mingo County.

In Harvey District, the Williamson Coal is nearly everywhere under drainage and there is little information concerning it. At Dingess, where it should crop, the horizon is occupied by a heavy sandstone.

In Chapter VI, it is noted in the section for Dingess Trace Branch, where it is 0′ 3″ thick.

The two following exposures, examined by Reger in the western part of the district, show the coal to be of little value:

Coal Exposure—No. 416 on Map II.

On Jennie Creek, 1.6 miles northeast of Spaulding; **Williamson Coal**; elevation, 760′ B.

			Feet.	Inches
Sandstone, massive				
Coal	0′	6″		
Fire clay	1	0		
Shale, sandy	8	0		
Sandstone, massive	1	0		
Coal	0	3	10	9

Coal Exposure—No. 417 on Map II.

On Jennie Creek, 1.3 miles northeast of Spaulding; **Williamson Coal**; elevation, 770′ B.

			Feet.	Inches
Sandstone, massive				
Coal	1′	0″		
Shale, gray	0	5		
Coal	0	6		
Shale, gray	0	1		
Coal	0	7	2	7
Fire clay and sandy shale			10	0
Concealed to H. C. Closterman gas well (No. 112 on Map II)			10	0

Warfield District, Mingo County.

In Warfield District, the Williamson Coal is above drainage along Marrowbone Creek and along Tug Fork on either side of the Warfield Anticline, but the prospects observed do not indicate a coal of minable thickness.

In Chapter IV, it is mined in the section for Kermit, and in Chapter VI, it is recorded in that for Marrowbone Creek.

On the head of Buck Branch of Marrowbone Creek, according to Reger, the Williamson Coal is only 1 foot thick at an elevation of 800′ B.

Two openings, examined by Reger farther up the creek, show the following:

Coal Prospect—No. 418 on Map II.

On Marrowbone Creek, below Pickletub Branch, 3.1 miles northeast of Kermit; **Williamson Coal**; elevation, 650′ B.

			Feet.	Inches
Sandstone, massive				
Coal, gas	0′	10½″		
Slate, dark	0	1½		
Coal, splint	1	6		
Shale, gray	0	3		
Coal, visible	0	8	3	5

Coal Prospect—No. 419 on Map II.

At the mouth of Pickletub Branch of Marrowbone Creek, 3.3 miles northeast of Kermit; **Williamson Coal**; elevation, 670′ B.

			Feet.	Inches
Sandstone, massive				
Coal, soft	0′	11″		
Slate, dark	0	1		
Coal, soft	0	5½		
Slate, gray	0	1½		
Coal, soft	0	3½		
Coal, heavy	0	3½		
Coal, soft	0	6	2	8
Shale				

Hardee District, Mingo County.

In Hardee District, there are numerous outcrops of the Williamson Coal, but they show a large percentage of slate and shale, so that it can not be regarded as of minable purity.

In Chapter IV, the coal is noted in the section for Naugatuck, where it is slaty.

The following exposure was examined by Hennen near the Hardee-Harvey District Line:

N. & W. Ry. Cut—No. 420 on Map II.

On Laurel Fork of Pigeon Creek, 0.7 mile east of Canterbury; **Williamson Coal**; elevation, 695′ B.

				Feet	Inches
Shale					
Coal	0′	5″	Upper Bench	4	7
Shale, gray	2	4			
Coal, slaty	1	10			
Shale, gray				3	0

				Feet.	Inches.
Sandstone, broken and shaly				7	0
Coal, splint	1'	1"	Lower Bench	2	11
Shale, gray	1	1			
Coal, splint	0	4			
Slate, black, bony	0	5			
Shale, gray, to railroad grade				4	6

Another exposure, measured by Hennen a short distance westward, shows the following:

N. & W. Ry. Cut—No. 421 on Map II.

On Laurel Fork of Pigeon Creek, 0.5 mile east of Canterbury; **Williamson Coal**; elevation, 690' L.

				Feet	Inches
Shale, black				8	0
Coal	0'	5"	Upper Bench	2	5
Shale, dark	1	0			
Coal	1	0			
Shale, gray				8	0
Coal, gas	0'	6"	Lower Bench	2	9
Slate, gray	0	0½			
Coal, splint	0	6			
Slate, black	0	1			
Coal, splint	0	11			
Shale, gray	0	2			
Coal, slaty	0	3			
Shale, gray	0	2½			
Coal, slaty	0	1			
Shale, to railroad grade				5	0

At the following opening, examined by Reger, the coal was once used for local fuel:

Coal Opening—No. 422 on Map II.

On Laurel Fork, 0.3 mile south of Canterbury; **Williamson Coal**; elevation, 705' B.

			Feet.	Inches
Shale, sandy				
Coal	0'	4"		
Slate	0	0½		
Coal	1	0½		
Slate, black	0	2½		
Coal	0	8½	2	4
Shale, gray				

The following exposure was examined by Reger in a railroad cut:

N. & W. Ry. Cut—No. 423 on Map II.

On Laurel Fork, at the mouth of Coal Spring Fork, 0.8 mile southwest of Canterbury; **Williamson Coal**; elevation, 690′ B.

			Feet.	Inches
Shale, sandy			15	0
Coal	0′	7″		
Slate, gray	0	1		
Coal	0	11		
Slate, black, hard	0	2		
Coal	0	10	2	7
Sandstone and shale, with coal streaks, to grade			32	0

The coal is opened for local use at the following place, according to Reger:

John Sword Farm Mine—No. 424 on Map II.

On Right Fork of Laurel Fork of Pigeon Creek, 1.8 miles east of Canterbury; **Williamson Coal**; elevation, 770′ B.

			Feet.	Inches
Shale, sandy				
Coal	0′	4″		
Slate	0	2		
Coal	0	8		
Shale, gray	0	6		
Coal, lenticular	0	3		
Shale, gray	0	4		
Coal, soft, with streaks of slate	2	2	4	5
Fire clay and sandy shale to creek			15	0

A prospect farther up the same fork, examined by Reger, shows the following:

Coal Prospect—No. 425 on Map II.

On Right Fork of Laurel Fork of Pigeon Creek, 2.1 miles east of Canterbury; **Williamson Coal**; elevation, 765′ B.

			Feet	Inches
Shale, sandy				
Coal	0′	2″		
Slate	0	1		
Coal, soft	0	10		
Shale, gray	0	8		
Coal	0	3		
Shale	0	4		
Coal, soft, slaty, visible	1	3	3	7
Concealed				

On main Pigeon Creek, the following was observed by Reger:

Coal Prospect—No. 426 on Map II.

On Pigeon Creek, 2.6 miles southeast of Lenore; Williamson Coal; elevation, 660′ B.

			Feet	Inches
Sandstone, massive			30	0
Coal	1′	1″		
Shale, gray	1	2		
Coal	0	2	2	5
Sandstone, massive, to Pigeon Creek			20	0

The following opening was examined by Reger on a branch of Pigeon Creek:

L. D. Starr Farm Mine—No. 64 on Map II.

On Trace Fork of Pigeon Creek, 2.5 miles southwest of Myrtle; Williamson Coal; elevation, 735′ B.

	Feet	Inches
1. Shale, sandy		
2. Coal, semi-splint	2	3
3. Fire clay, concealed, sandstone and shale to Cedar Grove Coal	68	0

A sample was collected from the coal, No. 2 of section, the composition of which is reported under Mine No. 64 in the table of analyses at the end of this Chapter. The analysis shows the coal low in ash and phosphorus but high in sulphur. It has a good reputation for local fuel in this community.

The coal has been prospected at several places along Trace Fork, most of which have fallen shut. The following was examined by Reger:

Cole & Crane Prospect—No. 427 on Map II.

On Right Fork of Trace Fork, 1.7 miles east of Myrtle; **Williamson Coal**; elevation, 815′ B.

			Feet	Inches
Limestone, silicious, Dingess			0	6
Shale, gray			15	0
Coal	0′	4″		
Shale, gray	4	0		
Coal, semi-splint	1	7		
Shale, gray	0	5		
Coal	0	2		
Shale, gray	0	3		
Coal, splint	1	3	8	0
Shale, gray				

Along Tug Fork, above Naugatuck, the coal has been prospected, but most of the openings have fallen shut. The following was examined by Hennen:

N. & W. Ry. Cut—No. 428 on Map II.

On Tug Fork, 0.3 mile southwest of Maher; **Williamson Coal**; elevation, 645′ B.

			Feet	Inches
Limestone, fossiliferous, Dingess			2	0
Shale, dark, with iron ore nodules			18	0
Coal, splint	0′	6″		
Shale, gray	0	2½		
Coal, splint	1	0		
Shale, gray	0	1		
Coal, splint	0	11		
Shale, gray	0	1		
Coal, splint	0	3	3	0½
Shale and sandstone to grade			7	0

In the southern end of Hardee District, the following opening was examined by Gawthrop:

Coal Opening—No. 429 on Map II.

On Miller Creek, 2 miles northeast of Hatfield; **Williamson Coal**; elevation, 715′ B.

			Feet	Inches
Shale				
Coal, gas	0′	11″		
Slate	0	0½		
Coal, harder	0	7		
Shale, gray	0	6		
Coal, soft	0	6	2	6½
Shale				

Lee District, Mingo County.

In Lee District, the Williamson Coal loses much of its impurity and becomes an important seam, being mined commercially with satisfactory results.

In Chapter IV, it is noted in the sections for Ragland, Chattaroy, Rawl, Sprigg, and Little Coon Knob, and in Chapter VI, it is recorded in that for Hatfield Post-Office.

In the northern part of the district the coal was not noted in minable thickness, although its horizon is above drainage along the creeks. At the three forks of Elk Creek, 1 mile southeast of Bias, Gawthrop noted 1′ 2″ of coal at an elevation of 895′ B., and at a point three-fourths mile southwest of Bias he noted 0′ 10″ of coal at 870′ B.

At the following mine, examined by Hennen, the coal was once operated commercially, but was abandoned in 1907:

Big Splint Coal Co. Mine (Abandoned)—No. 430 on Map II.

On Tug Fork, 0.5 mile northeast of Nolan; Williamson Coal; elevation, 715′ B.

			Feet	Inches
Limestone, silicious, fossilliferous, Dingess			1	6
Shale			20	0
Coal	0′	2″		
Slate, gray	0	2		
Coal	0	2		
Slate	0	2		
Coal. splint	1	9		
Slate, gray	0	0½		
Coal	0	7	3	0½
Concealed by water				

The following opening was examined by Hennen:

Farm Mine—No. 431 on Map II.

On Tug Fork, at Nolan; Williamson Coal; elevation, 718′ L.

			Feet	Inches
Coal	0′	3″		
Slate	0	2		
Coal, splint	2	6		
Slate	0	1		
Coal, splint	0	4	3	4
Shale, sandy				

The coal was once opened one-half mile above Nolan, according to Hennen, at an elevation of 745′ B., but the mine had fallen shut when examined.

The following mine operates the coal commercially:

Mary Helen Coal Co. Mine—No. 65 on Map II.

On Tug Fork, at Hatfield; Williamson Coal; elevation, 805′ B.

				Feet	Inches
1.	Shale				
2.	Coal, gas	0′	6″		
3.	Shale, gray	0	2		
4.	Coal, splinty	0	2		
5.	Coal, gas, hard	0	8		
6.	Coal, gas, softer	1	8		
7.	Bone	0	2		
8.	Coal, gas	0	6	3	10
9.	Slate				

"Coal owned by Mrs. Virginia Hatfield; principal office, Roanoke, Va.; daily capacity, 400 tons; daily output, 200 tons; 10 laborers and 20 miners employed; electric haulage; used for domestic fuel; shipped east; no butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 5, 6 and 8 of section, in Room No. 4 off Straight Heading of No. 2 Drift, by R. M. Gawthrop; C. C. New, Foreman, authority for data."

The composition of the sample is published under Mine No. 65 in the table at the end of this Chapter.

The following opening was examined by Gawthrop in the same region:

Coal Opening—No. 432 on Map II.

On Dans Branch of Tug Fork, 0.7 mile east of Borderland; Williamson Coal; elevation, 810′ B.

			Feet	Inches
Sandstone, flaggy			4	0
Shale, gray			1	0
Coal, gas	0′	5½″		
Shale, gray	0	0½		
Coal, medium hard	2	5		
Shale, black	0	2		
Shale, gray	0	5		
Coal, hard	0	6	4	0
Concealed				

The following opening was examined by Hennen:

Coal Opening—No. 433 on Map II.

At the mouth of Buffalo Creek, at Chattaroy; **Williamson Coal**; elevation, 855′ B.

			Feet	Inches
Coal, gas	0′	8″		
Slate, gray, 2″ to	0	3		
Coal, gas	0	6		
Coal, splint	2	0	3	5
Concealed by water				

The following opening is reported by Gawthrop:

Coal Opening—No. 434 on Map II.

On Sugartree Creek, 1.1 miles southeast of Goodman; **Williamson Coal**; elevation, 840′ B.

			Feet	Inches
Shale, visible			1	0
Coal, medium hard	0′	5″		
Shale	0	2½		
Coal, medium hard	2	3½		
Slate, black	0	1		
Coal, medium hard	0	9	3	9
Shale				

Prospect No. 435, on Lick Creek, 2 miles N. 25° E. of Rawl, at an elevation of 965′ B., was closed when examined by Gawthrop, but the coal was reported 1′ 6″ thick.

The following opening was examined by Hennen farther up Tug Fork:

Coal Opening—No. 436 on Map II.

On Dick Williamson Branch of Tug Fork, 0.8 mile northeast of Rawl; **Williamson Coal**; elevation. 970′ L.

			Feet	Inches
Shale, sandy with nodules of iron			5	0
Coal, gas	0′	5″		
Slate, gray	0	4		
Coal, splint	2	1	2	10
Slate				

Williamson District, Mingo County.

In Williamson District, the Williamson Coal is better developed than in any other district in the two counties and is mined commercially.

In Chapter IV, the coal is noted in the section for Williamson, where it is 4′ 10″ thick.

The following opening was examined by Gawthrop:

Coal Opening—No. 437 on Map II.

On a branch of Tug Fork about one-half mile northwest of Williamson; Williamson Coal; elevation, 875′ B.

			Feet	Inches
Shale, dark gray, sandy				
Coal, gas	0′	3″		
Shale, gray	0	0½		
Coal, gas	0	5½		
Shale	0	3½		
Coal, hard	2	0		
Slate	0	1		
Coal, visible	0	3	3	4½
Concealed by water				

The two following openings were examined by Hennen near Williamson:

Coal Opening—No. 438 on Map II.

On Tug Fork, one-third mile north of Williamson; Williamson Coal; elevation, 875′ B.

			Feet	Inches
Limestone, silicious, with marine fossils, Dingess			0	6
Shale, sandy, buff, with marine fossils			35	0
Coal, gas	0′	4″		
Slate, gray	0	0½		
Coal, gas	0	8		
Coal, splint	3	0	4	0½
Slate				

Coal Opening—No. 439 on Map II.

On a short branch of Tug Fork, 0.5 mile northeast of Williamson; **Williamson Coal**; elevation, 895′ B.

			Feet	Inches
Shale, buff, sandy			15	0
Coal, gas	0′	6″		
Shale, gray	0	0½		
Coal, gas	0	6½		
Shale, gray	0	1		
Coal, splint	2	2		
Shale, gray	0	0½		
Coal, gas	0	8	4	0½
Shale				

At the following mine, the coal is operated commercially. This mine was once examined and sampled by Hennen and the results published in Vol. II(A), of the State Survey Reports, under the name of the **"Thacker" Coal**, but the correlation is changed in the present report to the **Williamson Coal** to correspond with recent information:

Williamson Coal & Coke Co. Mine No. 1—No. 66 on Map II.

On Tug Fork at the mouth of Williamson Creek, 0.5 mile southeast of Williamson; **Williamson Coal**; elevation, 940′ B.

			Feet	Inches
1. Slate, good roof				
2. Coal, semi-splint	1′	6″		
3. Coal, slaty	0	1		
4. Coal, semi-splint	0	7		
5. Slate, gray, 6″ to	0	0½		
6. Coal, semi-splint	0	6½		
7. Slate, gray, 2″ to	0	1½		
8. Coal, semi-splint	0	10	3	8½
9. Slate				

"Butts. N. 45° E.; faces, S. 45° E.; greatest rise, S. 45° E.; mine capacity, 120 tons; men employed, 24; coal shipped east and west for steam purposes; authority for mine data, J. D. Clarkston, Assistant Mine Foreman; sample from Nos. 2, 3, 4, 6 and 8 for analysis."

The composition of the sample is published under Mine No. 66 in the table at the end of this Chapter.

Another mine of this Company, located farther up the same creek, was examined and sampled by Hennen and the results published by I. C. White in Volume II(A), page 412, of the State Survey Reports, under the name of the "**Thacker**" **Coal**, which is here changed to the **Williamson**. The section is as follows:

Williamson Coal & Coke Co. Mine No. 2 (No. 1. Opening)—No. 67 on Map II.

On Williamson Creek, 1 mile east of Williamson; **Williamson Coal**; elevation, 915′ L.

				Feet	Inches
1.	Blue slate, good roof				
2.	Coal, semi-splint	0′	5″		
3.	Slate, 0″ to	0	0½		
4.	Coal, semi-splint	0	4		
5.	Slate, gray	0	3		
6.	Coal, semi-splint	2	6		
7.	Slate, gray, 0″ to	0	3		
8.	Coal, semi-splint, 9″ to	0	10	4	7½
9.	Slate				

"Butts, north and south; faces, east and west; greatest rise, southeast; mine capacity, 200 tons; men employed, 57; coal shipped east and west for steam purposes; authority for mine data, C. C. Fultz, Mine Foreman, sample from Nos. 2, 4, 6 and 8 for analysis."

The composition of the sample is published under Mine. No. 67 in the table at the end of this Chapter.

The same Company is starting a new plant across Williamson Creek. The opening was not driven into the hill far enough to sample when visited by Gawthrop in 1913, but the following section of the coal was measured:

Williamson Coal & Coke Co. Mine No. 2 (No. 2 Opening)—No. 440 on Map II.

On Williamson Creek, 1 mile northeast of Williamson; **Williamson Coal**; elevation, 910′ B.

			Feet	Inches
Shale, bluish gray			8	0
Coal, gas	0′	7″		
Shale, gray	0	0½		
Coal, gas	1	8		
Sulphur bone	0	1		
Coal, gas, hard	0	9		
Shale, gray	0	3½		
Coal, semi-splint	0	11	4	4
Slate				

Magnolia District, Mingo County.

In Magnolia District, the Williamson Coal is not so valuable a seam as in Lee or Williamson, but several outcrops and prospects were noted, principally along Pigeon and Mate Creeks.

In Chapter IV, it is noted in the section for Matewan, where it is 3′ 5″ thick.

The following prospect is noted by Gawthrop in the northern part of the district:

Coal Opening—No. 441 on Map II.

On Little Muusey Branch of Pigeon Creek, 0.9 mile northeast of Musick; Williamson Coal; elevation, 1230′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	8½″		
Shale	0	2		
Coal	0	5		
Shale, gray	1	0		
Coal, hard	1	11	4	2½
Shale, gray				

The following opening was examined by Gawthrop on another branch:

Coal Opening—No. 442 on Map II.

On Munsey Branch of Pigeon Creek, 1.5 miles southeast of Musick; Williamson Coal; elevation, 1320′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	9″		
Slate and shale	1	3		
Coal, gas	1	6	3	6
Shale				

The three following openings were examined by Hennen:

Ferrell Heirs Opening—No. 443 on Map II.

On Pigeon Creek, 1 mile northeast of Calico; **Williamson Coal**; elevation, 1305′ B.

			Feet	Inches
Sandstone, shaly				
Coal, gas	0′	8½″		
Bone	0	1		
Coal, splint	1	8½	2	6
Slate				

Coal Opening—No. 444 on Map II.

On Pigeon Creek, at the mouth of Thacker Fork, 0.8 mile northeast of Calico; **Williamson Coal**; elevation, 1325′ B.

			Feet	Inches
Sandstone, flaggy			10	0
Coal, gas	0′	8″		
Bone	0	1		
Coal, splint	1	10	2	7
Slate				

Coal Opening—No. 445 on Map II.

On Pigeon Creek, 0.7 mile northeast of Calico; **Williamson Coal**; elevation, 1345′ B.

			Feet	Inches
Sandstone, flaggy			5	0
Shale, dark			1	3
Coal, gas	0′	7″		
Bone	0	1		
Coal, splinty	2	4	3	0

The following exposure, examined by Hennen, shows a split in the coal:

Coal Exposure—No. 446 on Map II.

On Mate Creek, 0.3 mile southeast of Low Gap; **Williamson Coal**; elevation, 1060′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	1′	0″		
Shale	2	0		
Sandstone, massive	29	0		
Coal, splint	1	3		
Slate, gray	0	1		
Coal, slaty	0	1	33	5
Shale, gray				

The two following openings were examined by Hennen farther up the same creek:

Coal Opening—No. 447 on Map II.

On Mate Creek, at the mouth of Lick Branch, 1.3 miles northwest of Hinch; Williamson Coal; elevation, 1470' B.

			Feet	Inches
Sandstone, massive			5	0
Shale			0	4
Coal	0'	0⅛"		
Shale	1	1		
Coal, gas	2	0	3	1⅛
Fire clay and sandstone to creek			15	0

Coal Opening—No. 448 on Map II.

On Lick Branch of Mate Creek, 1.1 miles northwest of Hinch; Williamson Coal; elevation, 1480' B.

			Feet	Inches
Sandstone, massive				
Coal	0'	0¼"		
Shale	0	9		
Bone	0	1		
Coal, gas	1	11	2	9¼
Shale				

Stafford District, Mingo County.

In Stafford District, the Williamson Coal lies high in the hills and has been prospected but little. The sections examined show a coal that is too thin for successful mining.

The following opening was examined by Hennen:

Coal Opening—No. 449 on Map II.

On Horsepen Creek, 1.2 miles northeast of Calico; Williamson Coal; elevation, 1465' B.

			Feet	Inches
Sandstone, massive			3	0
Coal, gas	0'	4"		
Bone	0	1½		
Coal, splinty	2	0	2	5½
Slate				

The following opening is reported by Gawthrop:

Coal Opening—No. 450 on Map II.

On Horsepen Creek, 2 miles N. 70° W. of Horsepen; **Williamson Coal**; elevation, 1605′ B.

			Feet	Inches
Earth and shale				
Coal, gas	0′	6″		
Slate, black	0	1		
Coal, gas	2	6		
Shale, gray	0	8		
Coal, hard	1	4	5	1
Slate				

Quantity of Williamson Coal Available.

Based on the evidence of the preceding pages, the following estimate is made of the probable amount of Williamson Coal. The crop is not shown on Map II, but the area as determined by Gawthrop was found by making a slight addition to the area of the Dingess Limestone, which is the first stratigraphic horizon above the coal:

Probable Amount of Williamson Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres	Cubic Feet of Coal.	Short Tons of Coal
Logan:					
Chapmanville	1	44.00	28,160	1,226,649,600	49,065,984
Logan	2	207.00	132,480	11,541,657,600	461,666,304
Triadelphia	2	74.00	47,360	4.126,003 200	165,040,128
Totals		325.00	208,000	16,894,310,400	675,772.416
Mingo:					
Harvey	....	......	......	....	....
Warfield	....	......	......	....	....
Hardee	1	70.00	44,800	1,951,488,000	78,059,520
Lee	2.5	58.70	37,568	4,091,155.200	163,646,208
Williamson	3	1.50	960	125,452,800	5,018,112
Magnolia	2.5	39.50	25,280	2,752,992,000	110,119,680
Stafford	2.5	16.00	10,240	1.115,136,000	44,605,440
Totals		185.70	118,848	10,036,224,000	401,448,960
Totals for both Counties		510.70	326,848	26,930,534 400	1,077,221,376

THE CEDAR GROVE COAL.

The Cedar Grove Coal, which has been described briefly in Chapter VI, pages 170-2, is one of the most important coals in the two counties. It is mined extensively in both Logan and Mingo and yields a fine grade of steam and domestic fuel, usually having only one slate parting which is easily separated from the coal. Map II shows the outcrop of this coal and Figure 14 shows the regions where it is known or believed to be of commercial thickness and purity. In some localities it is too thin for mining.

Chapmanville District, Logan County.

In Chapmanville District, the Cedar Grove Coal, as shown by Map II, is above drainage along the principal creeks, but it is only in the southern part of the district, next to Logan, that coal of minable thickness occurs. In the northern part it becomes too thin for use. Only a few openings were found north of the Warfield Anticline.

The following coal opening, examined by Gawthrop, seems to represent the Cedar Grove in the western part of the district:

Coal Opening—No. 451 on Map II.

On the left branch of Hoover Fork of Hart Creek, 1.5 miles northwest of Whirlwind; Cedar Grove Coal; elevation, 825′ B.

			Feet	Inches
Shale, gray			10	0
Coal	0′	1½″		
Shale, gray	0	3½		
Coal	0	2		
Shale, gray	0	1		
Coal, hard	1	9	2	5
Slate				

The following prospect was examined by Reger in the same region:

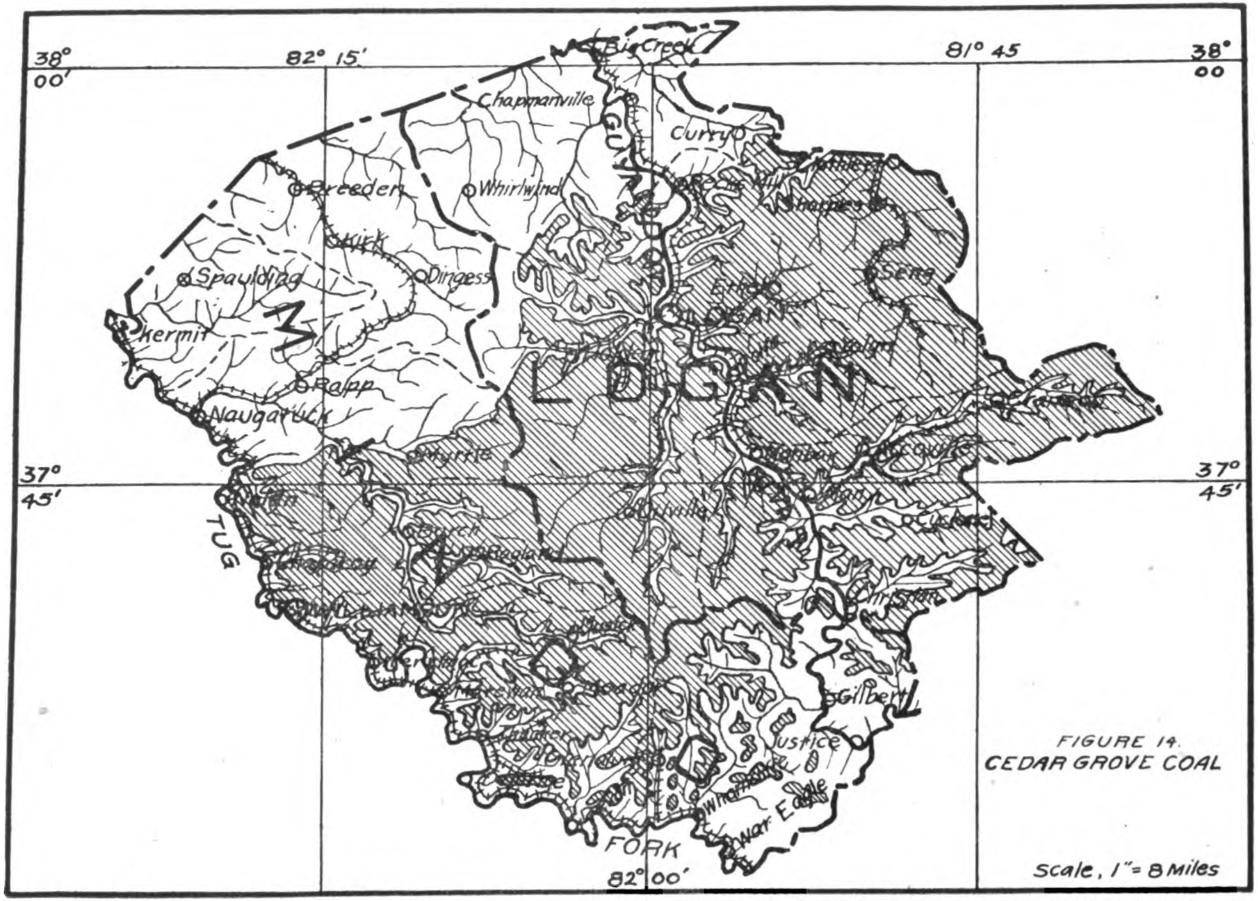

Figure 14. Showing Approximate Minable Area of Cedar Grove Coal. (See explanation in Authors' Preface).

Guyandot Land Association Prospect—No. 452 on Map II.

On Bulwark Branch of Hart Creek, 1.2 miles southwest of Whirlwind; **Cedar Grove Coal**; elevation, 920′ B.

			Feet	Inches
Sandstone, shaly			10	0
Shale, gray			1	0
Coal, slaty, rider			1	0
Concealed and brown shale			15	0
Coal	0′	8″		
Slate, black	0	2		
Coal	2	5	3	3

The following opening, examined by Reger and Gawthrop, shows the coal near the Warfield Anticline:

John Dingess Farm Mine—No. 453 on Map II.

On Crawley Creek, 0.8 mile east of Shively; **Cedar Grove Coal**; elevation, 1105′ B.

			Feet	Inches
Sandstone			10	0
Coal, slaty	0′	4″		
Shale, gray	1	0		
Coal, slaty	0	4		
Coal, splint	1	6		
Shale, gray	0	5		
Coal	0	7	4	2
Fire clay				

The following prospect, examined by Reger, shows the Cedar Grove Coal along the Warfield Anticline. The coal is 25′, hand level measurement, above the base of an opening in the Alma Coal and 140′ above an opening in the Campbell Creek (No. 2 Gas), leaving no doubt as to the correlation:

Lewis W. Dingess Prospect—No. 454 on Map II.

On Tims Fork of Crawley Creek, 2 miles east of Shively; **Cedar Grove Coal**; elevation, 1200′ B.

			Feet	Inches
Shale, sandy			30	0
Coal, soft	0′	7″		
Coal, splinty	1	9	2	4
Fire clay, sandstone and shale, to Alma Coal			22	0

The following opening was examined by Reger and Gawthrop:

Isaac Plumly Prospect—No. 455 on Map II.

On the head of Crawley Creek, 4.2 miles northwest of Logan; Cedar Grove Coal; elevation, 1120′ B.

			Feet	Inches
Shale				
Coal	1′	6″		
Slate	0	0¾		
Coal	0	4		
Shale, gray	0	8		
Coal	0	1		
Shale, gray	0	5		
Coal, splint, visible	2	0	5	0¾

At **Prospect No. 456 on Map II**, on Pigeonroost Branch of Crawley Creek, 4 miles northwest of Logan, the coal was once opened on the U. S. Coal & Oil Company's property at an elevation of 1100′ B., but had fallen shut when visited by Reger. It was reported a thick coal by residents.

The following opening was examined by Reger and Gawthrop on the same creek:

Bruner Farm Mine—No. 457 on Map II.

On the head of Crawley Creek, 3.8 miles northwest of Logan; Cedar Grove Coal; elevation, 1160′ B.

			Feet	Inches
Shale, brown, sandy			10	0
Coal, medium hard	0′	3″		
Coal, splint	1	8		
Slate	0	0½		
Coal, semi-splint	0	5		
Slate	0	5½		
Coal	0	2		
Slate	0	5½		
Coal, splint	2	9	6	2½
Fire clay				

In the neighborhood of Big Creek Station, on Guyandot River, the Cedar Grove Coal seems to be of no importance, as only a few inches could be found by Hennen and Reger along the river bluffs where its horizon is fully exposed.

Logan District, Logan County.

In Logan District, the Cedar Grove Coal attains a fine development, being nearly always present in the hills and usually having only one parting. It has been prospected or core tested over a large part of the district and is being mined extensively, being often called the "Island Creek" seam by the operators.

In Chapter IV, the coal is noted in the sections for Clothier, Logan and Oilville. In Chapter VI, it is recorded in those for Mud Fork, Holden, Whitman, Zinn Branch, Laurel Fork of Pine Creek, Stollings and Rum Creek. In the present Chapter, it is noted in Coal Test Borings Nos. 25, 26, 47A, 49, 50, 51, 54, 55, 56, 58, 64, 69, 70, 71, 77; 78, 79, 93, 94, 95, 96, 98, 99, 100 and 101.

Along the northwestern edge of Logan District, the following prospect was examined by Reger and Gawthrop:

Henry Lawson Prospect—No. 458 on Map II.

On the head of Buffalo Creek, 2.5 miles southwest of Henlawson; Cedar Grove Coal; 1125′ B.

			Feet	Inches
Shale, brown, sandy			15	0
Coal, medium hard	0′	4″		
Coal, splint	1	1		
Slate, black	0	0¾		
Coal, semi-splint	0	7		
Shale, dark gray	0	5		
Coal	0	2		
Slate, dark	0	6		
Coal, semi-splint	3	1	6	2¾
Fire clay and concealed to Alma Coal blossom			41	0

On another fork of the same stream, the following opening was examined by Reger and Gawthrop:

Henry Lawson Mine (Abandoned)—No. 459 on Map II.

On Right Fork of Buffalo Creek, 1.6 miles west of Henlawson; Cedar Grove Coal; elevation, 1110′ B.

			Feet	Inches
Shale, brown, sandy			10	0
Coal, soft	0′	8″		
Coal, semi-splint	3	3	3	11
Fire clay				

A mine was once started here for use at the lumber plant at the mouth of the creek, but the opening was made on the dip and had to be abandoned.

The following prospect was examined by Reger and Gawthrop on the east side of Guyandot River:

Henry Mitchell Prospect—No. 68 on Map II.

On Big Branch of Guyandot River, 1.1 miles southeast of Ralumco; **Cedar Grove Coal**; elevation, 1110′ B.

				Feet	Inches
1.	Shale, dark, sandy				
2.	Coal, semi-splint	1′	1″		
3.	Slate, bony	0	2		
4.	Coal, semi-splint	0	6		
5.	Coal, splint	2	0	3	9
6.	Slate, pavement				

A sample was collected for analysis from Nos. 2, 4 and 5 of section, the composition of which is published under Mine No. 68 in the table at the end of this Chapter. The analysis shows a high grade coal, very low in ash and phosphorus.

The following prospect was examined by Reger near the Chapmanville-Logan District Line:

U. S. Coal & Oil Co. Prospect—No. 460 on Map II.

On Upper Dempsey Branch of Mud Fork of Island Creek, 3 miles north of Holden; **Cedar Grove Coal**; elevation, 1080′ B.

			Feet	Inches
Shale, dark			10	0
Coal	1′	4″		
Slate, dark	0	2		
Coal	4	9	6	3
Fire clay, concealed, and sandstone, to Alma Coal			22	0

The Cedar Grove Coal was once opened at the **John A. Curry Prospect (No. 461 on Map II)**, on Mud Fork, 2.8 miles northeast of Holden, at an elevation of 765′ B., 35′ above an opening in the Alma Coal. The opening in the Cedar Grove had fallen shut when visited by Reger and Gawthrop, but Mr. Curry reported the coal 4′ 3″ thick.

On Copperas Mine Fork, the coal first appears above drainage in the western end at the following exposure, examined by Reger, along the creek:

U. S. Coal & Oil Co. Exposure—No. 462 on Map II.

On Copperas Mine Fork at the mouth of Copperas Rock Branch; 2 miles west of Holden; **Cedar Grove Coal**; elevation, 810′ L.

			Feet	Inches
Shale, sandy, with streaks of sandstone			25	0
Coal			0	8
Shale, dark			7	0
Iron ore			0	4
Shale, dark			1	8
Coal, 0″ to	0′	4″		
Slate, dark	1	6		
Coal, soft	0	10		
Slate, black	0	2		
Coal, semi-splint	1	6	4	4
Concealed by water				

The United States Coal & Oil Company, with general offices at Holden, operates several mines in the Holden region, where the coal shows great regularity, being highly regarded for steam and domestic fuel. The following is the mine farthest west, the coal being brought out by a slope:

U. S. Coal & Oil Co. Mine No. 8—No. 69 on Map II.

On the north side of Copperas Mine Fork, 1.0 mile northwest of Holden; **Cedar Grove Coal**; elevation, 733′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	0′	5″		
3.	Coal, splint	1	11		
4.	Slate	0	0¾		
5.	Coal, splint	1	0		
6.	Coal, semi-splint	0	7¼		
7.	Coal, gas, hard	0	10		
8.	Coal, gas, with small irregular streaks of sulphur	1	0		
9.	Coal, gas, hard	1	2	7	0
10.	Fire clay shale				

"Principal office, Holden; daily capacity, 1,400 tons; daily output, 1,300 tons; 40 laborers and 105 miners employed; electric haulage; used for steam and domestic fuel; mostly shipped west; butts, N. 27° 03′ W.; faces N. 62° 57′ E; greatest rise, 0.¾ per cent. S. 50° E.; sample collected from Nos. 2, 3, 5, 6, 7, 8 and 9 of section in Room No. 2 off 1st Butt Left, by R. M. Gawthrop; A. R. Beisel, General Superintendent, authority for data. The worst part of No. 8 of section is thrown out, and the remainder with No. 9 of section is shipped as slack coal. At places, No. 2 of section is also discarded."

The composition of this sample is published under Mine No. 69 in the table at the end of this Chapter.

The following mine, operated by slope, is opposite No. 8:

U. S. Coal & Oil Co. Mine No. 7—No. 70 on Map II.

On Copperas Mine Fork, 1.0 mile northwest of Holden; **Cedar Grove Coal**; elevation, 730′ L.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, gas	0′	5″		
3.	Coal, splint	1	7		
4.	Slate	0	1		
5.	Coal, splint	0	7		
6.	Coal, gas, hard	0	3		
7.	Coal, splint	0	8		
8.	Coal, semi-splint	0	6		
9.	Coal, gas, with small irregular streak of sulphur	1	0		
10.	Coal, gas, hard	1	0	6	1
11.	Fire clay shale				

"Daily capacity, 1,400 tons; daily output, 1,300 tons; 33 laborers and 105 miners employed; sample No. 68G collected from Nos. 2, 3, 5, 6, 7, 8, 9 and 10 of section; sample No. 68Ga from Nos. 3, 5, 6. 7, and 8; and sample No. 68Gb from Nos. 2, 9 and 10 of section, in Room No. 1 off 3rd Butt off 1st Right Heading, by R. M. Gawthrop; see Mine No. 69 for other data."

The analyses of these samples, one from the splint and one from the gas layers, are published under Mine No. 70 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by Hennen and the results published in Volume II(A), page 385, of the State Survey Reports under the name of the **No. 2 Gas Coal**:

U. S. Coal & Oil Co. Mine No. 1—No. 71 on Map II.

On the south side of Copperas Mine Fork, 0.3 mile east of Holden; **Cedar Grove Coal**; elevation, 726′ L.

				Feet	Inches
1.	Slate, good roof				
2.	Coal, semi-splint	0′	9″		
3.	Coal, splint	1	6		
4.	Shale, gray, hard	0	1½		
5.	Coal, semi-splint	0	11		
6.	Coal, splint	1	0		
7.	Coal, semi-splint	2	7	6	10½
8.	Slate				

"Butts, N. 27° W.; faces, N. 63° E.; greatest rise, N. 27° W.; mine capacity, 1,200 tons; men employed, 160; coal shipped west; 'lump' and 'egg' for domestic, and 'run-of-mine' and 'slack' for steam purposes; authority for mine data, J. M. Moore, Mine Foreman; sample from Nos. 2, 3, 5, 6, and 7 for analysis."

The composition of this sample is published under Mine No. 71 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by Hennen and the results published in Volume II(A), page 386, of the State Survey Reports, under the name of the **No. 2 Gas Coal**:

U. S. Coal & Oil Co. Mine No. 2—No. 72 on Map II.

On the north side of Copperas Mine Fork, 0.4 mile northeast of Holden; Cedar Grove Coal; elevation, 725′ L.

				Feet	Inches
1.	Slate, hard, excellent roof				
2.	Coal, semi-splint	0′	9″		
3.	Coal, gray, splint	1	6		
4.	Slate, or gray shale, hard	0	2		
5.	Coal, gray splint, mostly	1	9		
6.	Coal, semi-splint	2	6	6	8
7.	Slate				

"Butts, N. 27° W.; faces, S. 63° W.; greatest rise, N. 27° W.; mine capacity, 1,800 tons; men employed, 178; coal shipped mostly west for steam and domestic purposes; authority for mine data, G. W. Lax, Mine Foreman; sample from Nos. 2, 3, 5 and 6 for analysis."

The composition of this sample is published under Mine No. 72 in the table at the end of this Chapter.

U. S. Coal & Oil Co. Mine No. 6—No. 73 on Map II.

On Aldrich Branch of Copperas Mine Fork, 1 mile N. 70° E. of Holden; Cedar Grove Coal; elevation, 731′ L.

				Feet	Inches
1.	Shale, bluish gray			15	0
2.	Coal, gas	0′	6″		
3.	Coal, splint	1	6½		
4.	Slate	0	2½		
5.	Coal, splint	0	7		
6.	Coal, gas, hard	0	2		
7.	Coal, splint	1	0		
8.	Coal, semi-splint	0	7		
9.	Coal, gas, with small irregular streaks of sulphur	1	0		
10.	Coal, gas, hard	1	0	6	7
11.	Fire clay shale				

"Daily capacity, 1,300 tons; daily output, 1,050 tons; 28 laborers and 85 miners employed; electric haulage; sample collected from Nos. 3, 5, 6, 7, 8, 9 and 10 of section at face of No. 7 Butt Entry, by R. M. Gawthrop; No. 2 of section is high in sulphur and is not loaded. See Mine No. 69 for other data."

The composition of the sample is published under Mine No. 73 in the table at the end of this Chapter.

Mine No. 6 of the U. S. Coal & Oil Co. on the opposite side of Aldrich Branch has been consolidated with No. 5.

The following mine is farther down the fork:

U. S. Coal & Oil Co. Mine No. 9—No. 74 on Map II.

On Copperas Mine Fork, 1.3 miles N. 80° E. of Holden; **Cedar Grove Coal**; elevation, 748′ L.

				Feet	Inches
1.	Shale, bluish gray			15	0
2.	Coal, gas	0′	7″		
3.	Coal, splint	1	8		
4.	Slate	0	2½		
5.	Coal, splint	0	7		
6.	Coal, gas	0	3		
7.	Coal. splint	1	2		
8.	Coal, gas, with a few small sulphur streaks	1	1½		
9.	Coal, gas, hard	1	4	6	11
10.	Fire clay shale				

"Daily capacity, 900 tons; daily output, 650 tons; 18 laborers and 40 miners employed; electric haulage; sample No. 70G collected from Nos. 2, 3, 5, 6, 7, 8 and 9 of section in Room No. 3 off 3rd Butt off 1st Right Heading, by R. M. Gawthrop; sample No. 70Ga collected from Nos. 2 and 3; and sample No. 70Gb collected from Nos. 5, 6, 7, 8 and 9 of section. Nos. 2 and 8 of section are assorted in some parts of the mine, but are good at point sampled. See Mine No. 69 for other data."

The analyses of these three samples, one from the entire mining section, one from the upper, and one from the lower bench, are published under Mine No. 74 in the table at the end of this Chapter.

The following mine is farther east:

U. S. Coal & Oil Co. Mine No. 3—No. 75 on Map II.

On Whitman Creek, 0.2 mile southeast of Whitman; **Cedar Grove Coal**; elevation, 733′ L.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, gas, with many small sulphur streaks	1′	1″		
3.	Coal, splinty	1	3		
4.	Slate	0	3		
5.	Coal, semi-splint	0	8		

				Feet.	Inches.
6.	Coal, splint	0′	2″		
7.	Coal, semi-splint	0	10		
8.	Coal, gas, high in sulphur	1	2		
9.	Coal, gas, better	1	0	6	5
10.	Fire clay shale				

"Daily capacity, 1,500 tons; daily output, 1,100 tons; 28 laborers and 95 miners employed; electric haulage; sample collected from Nos. 2, 3, 5, 6, 7, 8 and 9 of section, at face of 2nd Main Heading, by R. M. Gawthrop; Nos. 2, 8 and 9 of section are assorted at tipple. See Mine No. 69 for other data."

The composition of the sample is published under Mine No. 75 in the table at the end of this Chapter.

The following mine is opposite No. 3:

U. S. Coal & Oil Co. Mine No. 4—No. 76 on Map II.

On Whitman Creek, 0.3 mile southeast of Whitman; **Cedar Grove Coal**; elevation, 730′ L.

				Feet	Inches
1.	Shale, bluish gray			15	0
2.	Coal, gas, high in sulphur	0′	9″		
3.	Coal, splint	1	4		
4.	Slate	0	4		
5.	Coal, splint	0	4		
6.	Coal, semi-splint	0	4		
7.	Coal, splint	1	4		
8.	Coal, gas, soft	1	0		
9.	Coal, gas, harder	1	0	6	5
10.	Fire clay shale				

"Daily capacity, 1,500 tons; daily output, 1,200 tons; 38 laborers and 105 miners employed; electric haulage; sample collected from Nos. 2, 3, 5, 6, 7, 8, and 9 of section, at face of 4th Butt Entry, by R. M. Gawthrop; none of the coal from this mine is discarded; see Mine No. 69 for other data."

The composition of the sample is published under Mine No. 76 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by Hennen and the following results published in Volume II(A), page 384, of the State Survey Reports, under the name of the **No. 2 Gas Coal**:

Cora Coal & Coke Co., Cora Mine—No. 77 on Map II.

On Copperas Mine Fork, at Cora; **Cedar Grove Coal**, elevation, 775′ B.

				Feet	Inches
1.	Slate, good roof, sandy				
2.	Coal, semi-splint	0′	9″		
3.	Coal, splint, hard	0	11		
4.	Coal, gas, soft	0	3		
5.	Slate, black, 1½″ to	0	0½		
6.	Coal, splint, hard	3	7	5	6½
7.	Slaty fire clay, etc.				

"Butts, N. 45° W.; faces, S. 45° W.; mine capacity, 150 tons; men employed, 23; run of mine coal shipped south and west for steam; authority for mine data, C. W. Jones, Superintendent; sample from Nos. 2, 3, 4 and 6 for analysis."

The composition of this sample is published under Mine No. 77 in the table at the end of this Chapter.

The following mine is farther down the fork:

Shamrock Coal Co., Litz Mine—No. 78 on Map II.

On Copperas Mine Fork at Shamrock; **Cedar Grove Coal**; elevation, 805′ B.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, gas, hard	0′	9″		
3.	Coal, splint	0	5		
4.	Coal, semi-splint	0	7		
5.	Coal, gas	0	4		
6.	Coal, splint	0	3		
7.	Shale, 1″ to 3″	0	2		
8.	Coal, splint	0	3		
9.	Coal, semi-splint	0	2		
10.	Coal, splint	0	10		
11.	Coal, semi-splint	0	6		
12.	Coal, gas	1	10	6	1
13.	Slate				

"Coal owned by U. S. Coal & Oil Co., et al., principal office, Logan; daily capacity, 800 tons; daily output, 550 tons; 20 laborers and 40 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 20° W.; faces, N. 70° E.; greatest rise, N. 25° W.; pocket compass determinations; sample collected from Nos. 2, 3, 4, 5, 6, 8, 9, 10, 11 and 12 of section in Room No. 32 off Main Air Course, by R. M. Gawthrop; J. B. Agee, Superintendent, authority for data."

The composition of this sample is published under Mine No. 78 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by Hennen and the results published in Volume II(A), page 383, of the State Survey Reports, under the name of the "**No. 2 Gas Coal**":

Gay Coal & Coke Co., Gay Mine—No. 79 on Map II.

At the mouth of Copperas Mine Fork, 1 mile west of Logan; Cedar Grove Coal; elevation, 872.95′ L.

				Feet	Inches
1.	Slate, good roof				
2.	Coal, semi-splint	1′	11″		
3.	Coal, splint, gray, hard	0	1		
4.	Coal, semi-splint	0	6		
5.	Bone (some places gray shale), hard, 2″ to	0	1		
6.	Coal, semi-splint	3	0	5	7
7.	Slate				

"Principal office, Shamokin, Pa.; butts, S. 40° E.; faces, N. 50° E.; greatest rise, northeast; mine capacity, 350 tons; men employed, 75; coal shipped mostly west for steam and domestic purposes; authority for mine data, G. E. Shipe, Bookkeeper; sample from Nos. 2, 3, 4, 5 and 6 for analysis."

The composition of this sample is published under Mine No. 79 in the table at the end of this Chapter.

The two following mines operate the Cedar Grove Coal on the mountain just across the Guyandot River from Logan:

Aracoma Coal Co., Mine No. 2—No. 80 on Map II.

On Coal Branch of Island Creek, 0.8 mile northwest of Logan; Cedar Grove Coal; elevation, 1005′ B.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, gas	2′	4″		
3.	Coal, splint	0	4		
4.	Bone, 0″ to 3″	0	2		
5.	Coal, splint	0	9		
6.	Coal, gas	2	1	5	8
7.	Slate				

"Coal owned by Manley Coal Co. of Huntington; principal office, Logan; daily capacity, 1,000 tons; daily output, 600 tons; 20 laborers and 42 miners employed; electric haulage; used for steam and domestic fuel; shipped east and west, mostly west; greatest rise, N. 20° E.; butts, N. 40° W.; faces, N. 50° E.; pocket compass determinations; sample collected from Nos. 2, 3, 5 and 6 of section in Room No. 3 off 2nd Left Butt Entry by R. M. Gawthrop; I. B. Early, Auditor, authority for data."

The composition of the sample is published under Mine No. 80 in the table at the end of this Chapter.

Aracoma Coal Co., Mine No. 1—No. 81 on Map II.

On Coal Branch of Island Creek, 0.9 mile northwest of Logan; Cedar Grove Coal; elevation, 1020′ B.

				Feet	Inches
1.	**Shale, bluish gray**			15	0
2.	**Coal, gas**	1′	9″		
3.	**Slate, 0″ to**	0	0½		
4.	**Coal, semi-splint**	0	9		
5.	**Slate, 0″ to 5″**	0	1		
6.	**Coal, splint**	0	3		
7.	**Bone, 0″ to 5″**	0	3		
8.	**Coal, splint**	0	8		
9.	**Coal, gas**	2	0	5	9½
10.	**Shale**				

"Daily capacity, 400 tons; daily output, 325 tons; 11 laborers and 26 miners employed; sample collected from Nos. 2, 4, 6, 8 and 9 of section, in Room No. 16 off 2nd Left Heading, by R. M. Gawthrop; I. B. Early, Auditor, authority; see Mine No. 80 on Map II for additional data."

The composition of this sample is published under Mine No. 81 in the table at the end of this Chapter.

In the northeastern end of Logan District, between Logan and Clothier, the Cedar Grove Coal is principally under drainage and its character must be studied in the records of the coal test borings published at the beginning of this Chapter. The coal was noted by Gawthrop at the **Shelvy Baldwin Prospect—(No. 463 on Map II)**, on a branch of Hewett Creek, 1.2 miles northwest of Lake, at an elevation of 1255′ B. The opening had fallen shut, but it was reported to show 30″ of clean coal.

On Main Island Creek, south of Logan, the coal has been prospected extensively and is also being mined at several points and some extensive new developments are being made at the present time.

The following mine in the Cedar Grove was examined and sampled by Hennen and the results published in Volume II(A), page 383, of the State Survey Reports, the coal being classified as the **"No. 2 Gas Coal"**.

Monitor Coal & Coke Co., No. 1 Mine—No. 82 on Map II.

On Island Creek, 0.2 mile north of Monitor; **Cedar Grove Coal**; elevation, 830′ B.

				Feet	Inches
1.	Sandy slate, hard, good roof				
2.	Coal, semi-splint	1′	1″		
3.	Coal, splint	1	4		
4.	Slate, black, hard, 6″ to	0	3		
5.	Coal, splint, hard	3	1½	5	9½
6.	Slate and concealed to Alma Coal			40	0

"Principal office, Shamokin, Pa; butts, S. 36° E.; faces, N. 54° E.; line of strike, N. 60° E.; mine capacity, 450 tons; men employed, 125; coal shipped mostly west, some east, for steam and domestic purposes; authority for mine data, J. E. Barlow, Superintendent; sample from Nos. 2, 3 and 5 for analysis."

The composition of this sample is published under Mine No. 82 in the table at the end of this Chapter.

Just across Island Creek is the following mine in the Cedar Grove that was examined and sampled by Hennen and the results published in Volume II(A), page 384, of the State Survey Reports, the coal being classified as the **"No. 2 Gas"**:

Yuma Coal & Coke Co., Yuma Mine—No. 83 on Map II.

On Island Creek, 0.3 mile west of Monitor; **Cedar Grove Coal**; elevation, 770′ B.

				Feet	Inches
1.	Slate, sandy, hard, good roof				
2.	Coal, semi-splint	1′	1″		
3.	Coal, splint	0	9		
4.	Coal, gas	0	9½		
5.	Slate, black, hard, 2″ to	0	1		
6.	Coal, splint	1	8		
7.	Coal, semi-splint	1	11	6	3½
8.	Slate				

"Principal office, Pottsville, Pa.; butts, S. 30° E.; faces, N. 60° E.; greatest rise, S. 60° W.; mine capacity, 200 tons; men employed, 20; coal shipped mostly west for steam and domestic use; authority for mine data, W. L. Stephens, Mine Foreman; sample from Nos. 2, 3, 4, 6 and 7 for analysis."

The composition of this sample is published under Mine No. 83 in the table at the end of this Chapter.

The following mine is located a short distance farther up Island Creek:

Monitor Coal & Coke Co. No. 2 (Beechwood)—No. 84 on Map II.

On Island Creek, 0.2 mile south of Monitor; **Cedar Grove Coal**; elevation, 746′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	1′	3″		
3.	Coal, semi-splint	1	0		
4.	Coal, splint	0	8		
5.	Shale, gray, 2″ to 1′ 0″	0	7		
6.	Coal, splint	0	6		
7.	Coal, semi-splint	1	7½		
8.	Sulphur, 0″ to	0	0½		
9.	Coal, gas	1	6	7	2
10.	Slate				

"Coal owned by Judge J. B. Wilkinson; principal office, Logan; daily capacity, 400 tons; daily output 850 tons; 14 laborers and 22 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped west; butts, N. 15° W.; faces, N. 75° E.; greatest rise, N. 20° W.; pocket compass determinations; sample collected from Nos. 2, 3, 4, 6, 7, and 9 of section, in Room No. 8 off No. 12 Cross Entry, by R. M. Gawthrop; Rosco Thornbury, Foreman, authority for data."

The composition of this sample is published under Mine No. 84 in the table at the end of this Chapter.

The following is a new mine recently opened by the same Company.

Monitor Coal & Coke Co., Mine No. 3—No. 85 on Map II.

On Island Creek, 0.5 mile southeast of Monitor; **Cedar Grove Coal**; elevation, 693′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	1′	3″		
3.	Coal, semi-splint	0	9½		
4.	Coal, splint	0	5		
5.	Coal, gas	0	5		
6.	Bone, 6″ to	0	2		
7.	Coal, splinty	1	3		
8.	Coal, gas	0	10		
9.	Shale, 0″ to	0	0½		
10.	Coal, gas, soft	0	6		
11.	Coal, gas, hard	0	5	6	1
12.	Slate				

"Coal owned by Judge J. B. Wilkinson; principal office, Logan; designed for a daily capacity of 2,000 tons; daily output, 600 tons; 26 laborers and 40 miners employed; electric haulage; used for steam by C. & O. Ry., not much of it shipped; butts, N. 15° W.; faces, N. 75° E.; greatest rise, N. 20° W.; pocket compass determinations; sample collected from Nos. 2, 3, 4, 5, 7, 8, 10 and 11 of section in 'B' Main Entry, 300 feet beyond No. 2 Cross Entry, by R. M. Gawthrop; Harry Barrett, Foreman, authority for data."

The composition of this sample is published under Mine No. 85 in the table at the end of this Chapter.

The following mine, which has recently been opened and is not fully developed, is located at the point where the Coalburg Syncline crosses Island Creek. The coal lies a few feet below drainage, making a short slope necessary:

Logan Mining Co., Mona Mina—No. 86 on Map II.

On Island Creek, at Monaville; **Cedar Grove Coal**; elevation, 669′ L.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal, gas	1′	1″		
3.	Coal, semi-splint	1	0		
4.	Coal, gas, hard	0	4		
5.	Slate, 0″ to	0	0¾		
6.	Bone, 0″ to	0	1		
7.	Coal, splint	0	5		
8.	Coal, gas	0	3		
9.	Coal, splint	0	6		
10.	Coal, semi-splint	1	0		
11.	Coal, gas	1	7	6	3¾
12.	Slate				

"Coal owned by Judge J. B. Wilkinson et al.; principal office, Fairmont; daily capacity, 500 tons; daily output, 200 tons; 5 laborers and 4 miners employed; mule haulage; used for steam and domestic fuel; shipped east and west; butts, N. 20° W.; faces, N. 70° E.; greatest rise, N. 20° W.; pocket compass determinations; sample collected from Nos. 2, 3, 4, 7, 8, 9, 10 and 11 of section, at face of No. 1 Main Heading, 225 feet above No. 1 Butt Heading, by R. M. Gawthrop; W. G. Whitman, Foreman, authority for data."

The composition of this sample is published under Mine No. 86 in the table at the end of this Chapter.

At **Opening No. 464 on Map II,** on Island Creek, 0.4 mile southwest of Monaville, the coal was once mined for farm use, but the opening has been abandoned and had fallen partly shut when visited by Reger and Gawthrop. This opening has an elevation of 705′ B., being 7 feet above drainage.

At **Prospect No. 465 on Map II,** made by the U. S. Coal & Oil Co. on Island Creek, 0.6 mile south of Monaville, the top of the coal had just been reached when the shaft was examined by Reger. Allowing 6 feet for the thickness of the coal, its elevation would be 710′ L.

For the next mile and a half up Island Creek, the Cedar Grove Coal is just below drainage. The rider which is 9 feet

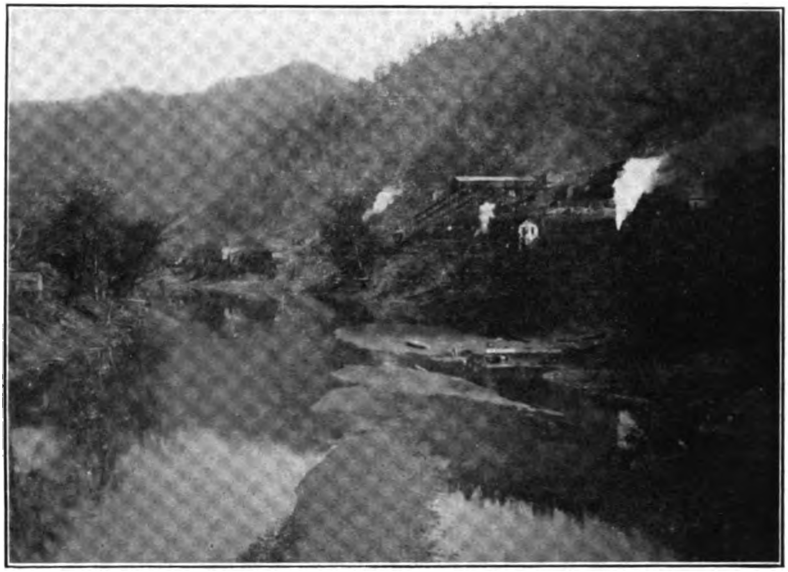

PLATE XII (a)—Showing Draper Coal Co. plant at Logan and topography of Kanawha Series.

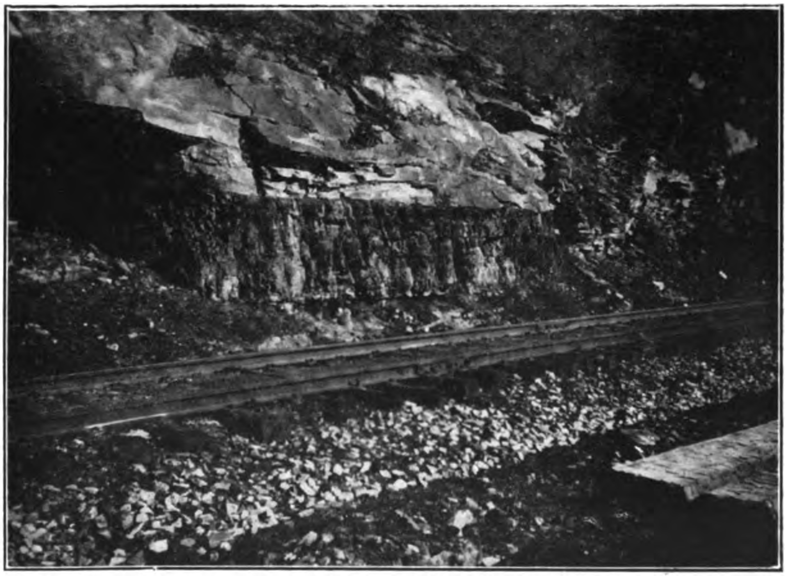

PLATE XII (b)—Showing crop of Campbell Creek (No. 2 Gas) or "Warfield" Coal and overlying Peerless Sandstone at Kermit, Mingo County.

above it shows at creek level at Zinn Branch, as shown by the section for that place, published in Chapter VI.

The following mine is a new one just being started along the new extension of the C. & O. Ry. up Island Creek:

Island Creek Colliery Co. Mine—No. 87 on Map II.

On Island Creek, at Switzer; Cedar Grove Coal; elevation, 748′ L.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	1′	1″		
3.	Coal, semi-splint	0	6		
4.	Coal, gas	0	11		
5.	Shale, gray ⎫ 0′ 3″	0	7		
6.	Coal, gas ⎬ to	0	3		
7.	Shale, gray ⎭ 1′ 6″	0	8		
8.	Coal, splinty	0	10		
9.	Shale	0	1		
10.	Coal, cannel, 0′ 3″ to 2′ 2″	0	6		
11.	Coal, splint	0	6		
12.	Coal, gas	1	6	7	5
13.	Slate				

"Coal owned by Island Creek Colliery Co. (Thomas Steel et al.); principal office, Switzer; plant is designed for daily capacity of 2,000 tons; plant not yet in operation (Nov. 1918); sample 46G collected from Nos. 2, 3, 4, 6, 8, 11 and 12, and No. 46Ga from No. 10, of section, 50 feet from mouth of prospect opening on south side of Island Creek, at Switzer, by R. M. Gawthrop. The mine superintendent is authority for data."

The coal here carries a layer of fine cannel coal, having a variable thickness. The analyses of the two samples, one from the gas and splint layers and one from the cannel, are published under Mine No. 87 in the table at the end of this Chapter.

Above Switzer, the Cedar Grove Coal has been thoroughly prospected by the Main Island Creek Coal Co., which is starting extensive developments on the land of Wood, Cole and Crane. In this region, the Lower Cedar Grove Coal splits off the bottom of the parent seam, making a separate vein that preserves its identity to the head of Island Creek and across to Tug Fork in the region of Thacker, Mingo County. The split is merely an enlargement of the main slate of the Cedar Grove Coal, which develops into a heavy sandstone separating the two coals.

At one of the prospects mentioned above, the following section was measured by Reger and Gawthrop:

Wood, Cole & Crane Prospect—No. 466 on Map II.

On Island Creek, 0.8 mile south of Switzer; **Cedar Grove Coal**; elevation, 800′ L.

			Feet	Inches
Shale, sandy			15	0
Coal, rider			2	0
Shale			5	0
Coal	2′	10″		
Slate, black	0	1½		
Coal	1	6		
Coal, cannel	0	10		
Coal, visible	1	6	6	9½
Concealed				

Another prospect, examined by Reger and Gawthrop, shows the following:

Wood, Cole & Crane Prospect—No. 467 on Map II.

On Island Creek, 1.5 miles south of Switzer; **Cedar Grove Coal**; elevation, 817′ L.

			Feet	Inches
Sandstone, flaggy			5	0
Coal, rider			1	6
Shale, dark			7	0
Coal	3′	1″		
Slate, dark	0	2		
Coal	1	6		
Slate, black	0	2		
Coal, cannel	0	8		
Coal	1	6	7	1
Fire clay				

Another prospect, examined by Reger, shows the following:

Wood, Cole & Crane Prospect—No. 468 on Map II.

On Island Creek, 1.7 miles south of Switzer; **Cedar Grove Coal**; elevation, 830′ L.

			Feet	Inches
Shale, brown				
Coal, rider			1	6
Shale			3	6
Coal	3′	3″		
Slate, black	0	2		
Coal	1	5		
Coal, cannelly	0	7		
Coal	2	0	7	5
Shale, concealed, sandstone, and shale to Alma Coal			68	0

The following prospect, the section of which was furnished by W. C. McCall, of Logan, and checked by Hennen, is farther up the creek:

Wood, Cole & Crane Prospect—No. 469 on Map II.

On Island Creek, at the mouth of Miller Branch, 2 miles south of Switzer; Cedar Grove Coal; elevation, 853' L.

			Feet	Inches
Sandstone				
Coal	1'	9"		
Slate	0	5		
Coal	3	2		
Slate	0	1		
Coal	2	9		
Slate	0	0½		
Coal	1	6	9	8½

The following prospect was measured by Hennen:

Wood, Cole & Crane Prospect—No. 470 on Map II.

On Middle Fork of Island Creek, 2.8 miles S. 10° E. of Switzer; Cedar Grove Coal; elevation, 955' L.

			Feet	Inches
Shale, sandy			5	0
Coal	0'	0½"		
Shale, gray	0	3		
Coal, gas	1	9		
Shale, dark gray	0	9		
Coal, semi-splint	3	7		
Slate, dark gray	0	1		
Coal, splint	0	5		
Slate, black	0	0½		
Coal, splint	1	8		
Coal, gas, hard	1	10	10	5
Slate				

Farther up the creek, the two bottom layers of the coal noted in this section split from the main seam to form the Lower Cedar Grove Coal as described above.

On Pine Creek, which empties into Island Creek 2.8 miles south of Switzer, an opening has been made in the Cedar Grove Coal, where Reger obtained the following:

Wood, Cole & Crane Farm Mine—No. 88 on Map II.

On Pine Creek, 2.1 miles northeast of Oilville; **Cedar Grove Coal;** elevation, 845′ L.

				Feet	Inches
1.	Shale, sandy				
2.	Coal, soft	1′	10″		
3.	Coal, splint	1	9		
4.	Slate, black	0	4		
5.	Coal, splint	2	2		
6.	Coal, softer	1	7	7	8
7.	Slate				

A sample was collected from Nos. 2, 3, 5 and 6 of section, the composition of which is published under Mine No. 88 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

Plans are now under way by the Main Island Creek Coal Co. to operate the coal near this opening.

The following prospect was examined by Hennen on another branch of Island Creek:

Wood, Cole & Crane Prospect—No. 471 on Map II.

On Rockhouse Branch of Island Creek, 2.3 miles northeast of Oilville; **Cedar Grove Coal;** elevation, 950′ B.

			Feet	Inches
Shale, sandy and flaggy				
Coal, gas, rider			2	4
Shale, gray			7	0
Coal, gas	3′	4″		
Shale, gray	0	9		
Coal	0	2½		
Shale, gray	0	4		
Coal, splinty	1	6		
Coal, gas, hard	2	1	8	2½
Fire clay				

On Cow Creek, the next large tributary of Island Creek, several openings have been made in the Cedar Grove. The following prospect is reported by Gawthrop:

Wood, Cole and Crane Prospect—No. 472 on Map II.

On Cow Creek, 1 mile northeast of Oilville; **Cedar Grove Coal**; elevation, 930′ B.

				Feet	Inches
Shale, sandy				2	0
Coal, slaty	0′	3″	"Rider"	2	1
Coal	1	10			
Shale, gray, sandy				7	0
Coal	2′	6″			
Bone, slaty	0	2			
Coal	0	8			
Shale	0	2			
Coal	0	2			
Shale, gray	2	0			
Coal, soft	0	3½			
Coal, hard	1	10			
Slate	0	0½			
Coal, hard	1	2		9	0
Slate					

Another prospect shows the following, according to Gawthrop:

J. L. Curry Prospect—No. 473 on Map II.

On Cow Creek, 0.6 mile northeast of Oilville; **Cedar Grove Coal**; elevation, 990′ B.

			Feet	Inches
Shale				
Coal, rider, reported			2	0
Concealed and shale			15	0
Coal	1′	6″		
Shale	0	1		
Coal	0	5		
Shale	0	1		
Coal	1	2	3	3
Shale, etc., to Lower Cedar Grove			23	0

At another prospect, Gawthrop obtained the following:

Wood, Cole & Crane Prospect—No. 89 on Map II.

On Seng Branch of Cow Creek, 0.3 mile southeast of Oilville, **Cedar Grove Coal**; elevation, 972′ L.

				Feet	Inches
1.	Shale, dark gray, sandy			5	0
2.	Coal, gas	0′	2″		
3.	Slate, black	0	0½		
4.	Coal, medium hard	1	0		
5.	Coal, splint	1	6		
6.	Slate	0	0½		
7.	Coal, bony	0	3	3	0
8.	Slate				

A sample was collected from Nos. 2, 4 and 5 of section, the composition of which is published under Mine No. 89 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

Above Cow Creek, the following prospect was examined by Hennen:

Wood, Cole & Crane Prospect—No. 474 on Map II.

On Island Creek, 1.5 miles northeast of Oilville; **Cedar Grove Coal**; elevation, 951′ L.

			Feet	Inches
Shale, dark, gray			15	0
Coal	0′	1″		
Shale, gray	0	2		
Coal, gas	1	11		
Shale, gray	3	5		
Coal, gas	2	3		
Coal, splint	1	0		
Shale, gray	0	4		
Coal	0	2		
Shale, gray	1	4		
Coal, gas	0	6		
Coal, splint	1	7		
Coal, gas, hard	1	6	14	3
Shale, gray				

The following opening was examined by Hennen:

Wood, Cole & Crane Prospect—No. 475 on Map II.

On Island Creek, 1.4 miles northeast of Oilville; **Cedar Grove Coal**; elevation, 965′ B.

			Feet	Inches
Shale			5	0
Coal, gas, hard	5′	0″		
Shale, gray	0	4		
Coal	0	2		
Shale, gray	2	2		
Coal, splinty at top	3	5	11	1
Shale, gray				

At **Prospect No. 476 on Map II,** on Little Creek, 1.1 miles S. 80° E. of Oilville, Hennen observed 4′ 2″ of clean coal at an elevation of 1030′ B.

The following prospect was examined by Hennen:

Wood, Cole, & Crane Prospect—No. 477 on Map II.

On Island Creek, 2.1 miles southeast of Oilville; Cedar Grove Coal; elevation, 1075' B.

			Feet	Inches
Sandstone, flaggy			5	0
Shale, gray			8	0
Coal	0'	1"		
Shale, gray	0	7		
Coal	5	0	5	8
Slate and concealed				

Another prospect examined by Hennen in the same region, shows the following:

Wood, Cole & Crane Prospect—No. 478 on Map II.

On Conley Branch of Island Creek, 3 miles southeast of Oilville; Cedar Grove Coal; elevation, 1138' L.

			Feet	Inches
Shale, sandy			5	0
Coal, splinty at bottom	5'	6"		
Shale, with coal streaks	0	4		
Coal	0	5		
Shale, gray	1	3		
Coal	0	2		
Shale, gray	0	11		
Coal, splinty at top	4	4	12	11
Fire clay				

The lower coal member of this section is the Lower Cedar Grove Coal, there being only a small parting between the two veins.

The following opening was examined by Hennen near by:

Wood, Cole & Crane Prospect—No. 479 on Map II.

On Conley Branch of Island Creek, 3.3 miles southeast of Oilville; Cedar Grove Coal; elevation, 1166' L.

			Feet	Inches
Sandstone, shaly			10	0
Shale, sandy			15	0
Coal	0'	1"		
Shale, with coaly streaks	0	2		
Coal	4	5		
Slate, black	0	1		
Coal	1	5	6	2
Fire clay, concealed, and shale to Lower Cedar Grove Coal			11	0

The following opening was examined by Hennen on another branch above the old Hatfield Fort:

Wood, Cole & Crane Prospect—No. 480 on Map II.

On a branch of Island Creek, 3.3 miles southeast of Oilville; **Cedar Grove Coal**; elevation, 1139′ B.

			Feet	Inches
Shale, flaggy			15	0
Coal	0′	0½″		
Shale	0	2		
Coal, gas	0	6		
Coal, splint	4	11	5	7½
Shale, concealed, and shale to Lower Cedar Grove Coal			15	0

The following prospect was examined by Reger and Gawthrop near the residence of Anderson Hatfield:

Wood, Cole & Crane Prospect—No. 481 on Map II.

On Island Creek, 2.6 miles southeast of Oilville; **Cedar Grove Coal**; elevation, 1141′ L.

			Feet	Inches
Sandstone and concealed				
Coal	2′	10″		
Slate, black	0	2		
Coal	2	2	5	2
Fire clay and concealed to Lower Cedar Grove Coal			29	0

At the **Wood, Cole & Crane Prospect (No. 482 on Map II),** on Island Creek, 3 miles S. 20° E. of Oilville, Hennen observed 4′ 10″ of clean coal at an elevation of 1163′ B.

On the Guyandot River, above the mouth of Island Creek, at Logan, several openings have been made in the Cedar Grove Coal.

At **Prospect No. 483 on Map II,** on Dingess Run, 0.5 mile east of Stollings, the Cedar Grove Coal was observed by Hennen as being three feet thick at an elevation of 670′ L.

The following was examined by Hennen:

Coal Opening—No. 484 on Map II.

On the Guyandot River, opposite McConnell Station; **Cedar Grove Coal**; elevation, 670′ B.

			Feet	Inches
Shale, sandy			20	0
Coal, slaty	1′	3″		
Shale, dark	6	0		
Coal, semi-splint	2	8		
Fire clay shale	1	5		
Coal, bony	0	1		
Fire clay	1	3		
Coal, splint	0	5		
Slate, gray	0	1		
Coal, splint	3	2	16	4
Fire clay			1	0

The following exposure was noted by Hennen along the public road:

Coal Exposure—No. 485 on Map II.

On Guyandot River, opposite Beech Branch, 0.4 mile southeast of McConnell; **Cedar Grove Coal**; elevation, 715′ B.

			Feet	Inches
Sandstone, massive, Upper Cedar Grove			15	0
Shale, sandy, dark, with iron ore nodules			5	0
Coal, slaty	0′	8″		
Shale, dark	4	0		
Coal, visible, 1′ 6″ to	2	0	6	8
Shale				

Another section, obtained by Hennen a short distance farther up the river shows the following:

Coal Exposure—No. 486 on Map II.

On the Guyandot River, opposite Beech Branch, 0.5 mile southeast of McConnell; **Cedar Grove Coal**; elevation, 690′ B.

			Feet	Inches
Sandstone, massive, Upper Cedar Grove			15	0
Shale, sandy			5	0
Coal, slaty	0′	8″		
Shale, dark	6	0		
Coal, soft	1	4		
Bone	0	2		
Coal, softer	0	3		
Sandstone, 0″ to	1	0		
Coal, gas	0	4	9	9
Shale and sandstone to Lower Cedar Grove Coal			24	0

At **Coal Exposure No. 487 on Map II,** on Guyandot River, 1 mile east of McConnell, Hennen observed 2′ 6″ of coal, at an elevation of 705′ B.

The following opening was examined by Hennen farther east:

Coal Opening—No. 488 on Map II.

On Righthand Fork of Rum Creek, 3.3 miles southeast of Rolfe; **Cedar Grove Coal**; elevation, 1041′ L.

			Feet	Inches
Sandstone, shaly, and flaggy			15	0
Coal 0″ to			0	0⅛
Shale, sandy			1	0
Coal, gas	0′	7″		
Slate, soft	0	0¼		
Coal, semi-splint	1	9½		
Coal, hard, splint	0	6		
Coal, gas, hard	0	8	3	6¾
Slate, pavement			1	0

An opening examined by Hennen on another branch shows the following:

Coal Opening—No. 489 on Map II.

On Second Righthand Branch of Rum Creek, 1.4 miles southwest of Yolyn; **Cedar Grove Coal**; elevation, 938′ L.

			Feet	Inches
Sandstone, shaly and flaggy, and sandy shale			20	0
Coal, slaty, 0″ to			0	1
Shale, sandy			2	0
Coal, good 12″ to	1′	3″		
Bony slate, ⅛″ to	0	1		
Coal, semi-splint	1	7		
Coal, hard, gray splint	0	4		
Coal, semi-splint	0	10	4	1
Slate, pavement				

Another opening examined by Hennen in the same region shows the following:

Coal Opening—No. 490 on Map II.

On Rum Creek, at the mouth of North Mudlick Branch, 1.2 miles southwest of Yolyn; **Cedar Grove Coal**; elevation, 896′ L.

			Feet	Inches
Sandstone, flaggy and shaly			20	0
Coal, gas	1′	6″		
Shale, gray, sandy, 9″ to	1	0		
Bone	0	3		
Coal, splinty	2	9	5	6
Concealed by water				

Triadelphia District, Logan County.

In Triadelphia District, the Cedar Grove Coal lies higher in the hills than in Logan and has not been so well prospected. Sufficient work has been done, however, to prove that the district contains good coal. It is mined commercially at several places.

In Chapter IV, the Cedar Grove Coal is noted in the section for Manbar, and in Chapter VI, it is recorded in those for Accoville and Buffalo Creek.

The following is the first mine found on Buffalo Creek:

Deegans Coal Co. Mine—No. 90 on Map II.

On Buffalo Creek at Kistler Station; **Cedar Grove Coal**; elevation, 1200′ B.

				Feet.	Inches.
1.	Shale, bluish gray, silicious			10	0
2.	Coal, gas	1′	0″		
3.	Bone	0	0½		
4.	Coal, gas, hard	0	9		
5.	Coal, semi-splint	1	0		
6.	Sulphur, 0″ to	0	0½		
7.	Coal, gas, hard	0	7		
8.	Coal, splinty	0	3		
9.	Coal, gas	0	4	4	0
10.	Shale				

"Coal owned by R. L. Joice; principal office, Yolyn; daily capacity, 300 tons; daily output, 100 tons; 9 laborers and 12 miners employed; mule haulage; used for steam; shipped east and west; butts and faces, irregular; greatest rise, S. 25° E., pocket compass determination; sample collected from Nos. 2, 4, 5, 7, 8 and 9 of section at face of 1st East Entry, 40 feet above Room No. 7, by R. M. Gawthrop; James Rister, Foreman, authority for data."

The composition of this sample is published under Mine No. 90 in the table at the end of this Chapter.

The following opening was observed by Hennen:

Coal Opening—No. 491 on Map II.

On a branch of Buffalo Creek, 0.7 mile north of Kistler; **Cedar Grove Coal**; elevation, 1130′ L.

			Feet	Inches
Shale			2	0
Coal, gas	0′	10″		
Coal, splint	3	1	3	11
Slate and fire clay				

The following is another commercial mine:

Crown Coal & Coke Co. Mine—No. 91 on Map II.

On Buffalo Creek, at Lax Station; Cedar Grove Coal; elevation, 1240′ B.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, gas	1′	1″		
3.	Bone, 0½″ to	0	1		
4.	Coal, gas	1	0		
5.	Coal, semi-splint	1	4		
6.	Coal, gas	0	5		
7.	Coal, semi-splint	0	3		
8.	Coal, gas	0	5	4	7
9.	Shale				

"Coal owned by Buffalo Creek Coal & Coke Co.; principal office, Huntington; daily capacity, 350 tons; daily output, 250 tons; 12 laborers and 20 miners employed; pony and electric haulage; used for steam; shipped east and west; no regular butts or faces; greatest rise, S. 35° E., pocket compass determination; sample collected from Nos. 2, 4, 5, 6, 7 and 8 of section, at face of South Entry, opposite 8th Right Entry, by R. M. Gawthrop; R. M. Lax, Foreman, authority for data."

The composition of this sample is published under Mine No. 91 in the table at the end of this Chapter.

The following information was obtained at another mine:

Avon Coal Co. Mine—No. 92 on Map II.

On Right Fork of Buffalo Creek, 0.4 mile southeast of Accoville; Cedar Grove Coal; elevation, 1205′ B.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	1′	0″		
3.	Coal, semi-splint	0	2		
4.	Coal, gas	0	11		
5.	Coal, semi-splint	1	3		
6.	Coal, gas	0	6		
7.	Coal, semi-splint	0	2		
8.	Coal, gas	0	6	4	6
9.	Fire clay shale				

"Coal owned by Buffalo Creek Coal & Coke Co.; principal office, Cincinnati, Ohio; daily capacity, 2,000 tons; daily output, 800 tons; 20 laborers and 50 miners employed; mule and electric haulage; used for steam and domestic fuel; shipped mostly east; butts and faces, irregular; greatest rise, S. 16° E.; sample collected from Nos. 2, 3, 4, 5, 6, 7 and 8 of section, at face of Main West Entry, 50 feet above Room No. 1, by R. M. Gawthrop; L. E. Scholl, Superintendent, authority for data."

The composition of the sample is published under Mine No. 92 in the table at the end of this Chapter.

The following information was obtained at another mine:

Amherst Coal Co., Mine No. 1—No. 93 on Map II.

On Buffalo Creek, at Amherstdale; **Cedar Grove Coal**; elevation, 1100′ L.

				Feet	Inches
1.	Shale, gray			15	0
2.	Coal			2	8
3.	Shale, bluish gray			6	0
4.	Coal, semi-splint	0′	7″		
5.	Coal, splint	0	7		
6.	Coal, gas	1	6		
7.	Coal, splint	0	3		
8.	Shale, gray	0	2½		
9.	Coal, gas	0	1		
10.	Bone	0	4		
11.	Coal, gas	0	11½	4	6
12.	Fire clay shale				

"Sample collected from Nos. 4, 5, 6, 7, and 11 of section, at face of Main Heading, 350 feet above 2nd Right Heading, by R. M. Gawthrop; J. N. Schwertzer, Superintendent, authority for data. See Mine No. 56 under Chilton Coal for other data."

The composition of the sample is published under Mine No. 93 in the table at the end of this Chapter:

An opening examined by Hennen in the same region shows the following:

Coal Opening—No. 492 on Map II.

On Mudlick Branch of Buffalo Creek, 0.5 mile north of Amherstdale; **Cedar Grove Coal**; elevation, 1075′ B.

			Feet	Inches
Sandstone, shaly			15	0
Coal, gas	2′	0″		
Slate	0	0⅛		
Coal, splinty	3	3	5	3⅛
Slate, gray				

The following opening was examined by Gawthrop:

Coal Opening—No. 493 on Map II.

On Cartwright Branch of Buffalo Creek, 1 mile southwest of Craneco; **Cedar Grove Coal**; elevation, 1370′ B.

			Feet	Inches
Shale, dark gray			10	0
Coal, hard	1′	5″		
Coal, gas	1	0		
Bone	0	1		
Coal, gas	0	5		
Shale, gray	0	2		

			Feet.	Inches.
Coal, soft	0′	8½″		
Shale, gray	0	1½		
Coal, soft	2	0	5	11
Concealed				

The following is another commercial mine:

Long Flame Coal Co. Mine—No. 94 on Map II.

On Buffalo Creek at Stow; **Cedar Grove Coal**; elevation. 1235′ B.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal, gas	0′	2″		
3.	Coal, splint	0	7		
4.	Coal, semi-splint	0	6		
5.	Coal, gas	0	9¼		
6.	Bone, 0¼″ to	0	0¾		
7.	Coal, gas	1	0		
8.	Shale, gray, 0″ to	0	3		
9.	Coal, gas	1	0		
10.	Fire clay	0	0½		
11.	Coal, semi-splint	0	6		
12.	Coal, gas	2	4	7	2½
13.	Fire clay shale				

"Coal owned by Union Coal & Land Co. and Boone County Coal Corporation; principal office, Bramwell; daily capacity, 650 tons; daily output, 500 tons; 20 laborers and 25 miners employed; used for steam; shipped west; mule and electric haulage; no regular butts or faces; greatest rise, S. 68° E., pocket compass determination; sample collected from Nos. 2, 3, 4, 5, 7, 9, 11 and 12 of section, at face of First Right Entry of No. 3 Drift, by R. M. Gawthrop; W. E. Pritchard, Superintendent, authority for data."

The composition of this sample is given under Mine No. 94 in the table at the end of this Chapter.

The following mine also operates the coal commercially:

Kohinoor Coal & Coke Co. Mine—No. 95 on Map II.

On Buffalo Creek, 1.0 mile N. 80° W. of Craneco; **Cedar Grove Coal**; elevation, 1282′ L.

				Feet	Inches
1.	Shale				
2.	Coal, gas	0′	2″		
3.	Coal, slaty	0	2		
4.	Coal, splinty	0	5		
5.	Coal, semi-splint	0	10		
6.	Coal, gas	1	8		
7.	Shale, gray	0	4		
8.	Coal, gas	0	1		
9.	Shale, gray	0	2		
10.	Coal, gas	1	2		
11.	Coal, semi-splint	0	5		
12.	Coal, gas	2	0	7	5
13.	Fire clay shale				

"Coal owned by Guy Porter and Buffalo Creek Coal and Coke Co.; principal office, Pottsville, Pa.; daily capacity, 700 tons; daily output, 600 tons; 22 laborers and 38 miners employed; electric haulage; used for steam and domestic fuel; shipped east and west; butts, N. 74° 30' E.; faces, N. 15° 30' W.; butts and faces not very regular: greatest rise, southeast; sample collected from Nos. 2, 4, 5, 6, 10, 11 and 12 of section, in Room No. 5 off 6th Right Heading, by R. M. Gawthrop; H. B. Poirier, Foreman, authority for data."

The composition of this sample is published under Mine No. 95 in the table at the end of this Chapter.

The following exposure was noted by Hennen along a branch:

Coal Exposure—No. 494 on Map II.

On Dingess Branch of Buffalo Creek, 1.5 miles southeast of Craneco; Cedar Grove Coal; elevation, 1480' B.

			Feet	Inches
Shale, sandy			15	0
Coal, splinty	2'	1"		
Shale, gray	0	1½		
Coal, splint	1	0	3	2½
Concealed in bed of Dingess Branch				

E. L. Gibson, a lumberman, reports that a boring was once made with a 6½ foot auger here without reaching the bottom of the coal:

The following opening was examined by Hennen:

Coal Opening—No. 495 on Map II.

On Toney Fork of Buffalo Creek, 2.3 miles northeast of Craneco; Cedar Grove Coal; elevation, 1420' B.

			Feet	Inches
Sandstone, massive			5	0
Shale			5	0
Coal, gas	0'	3"		
Slate, black	0	0½		
Coal	1	5		
Slate, gray	0	1½		
Coal and concealed	5	0		
Shale	5	0		
Coal, gas	2	0	13	10
Concealed by water				

Prospect No. 496, on Buffalo Creek, 2 miles N. 75° E. of Craneco, at an elevation of 1435' B., was fallen shut when visited by Hennen, but was reported by Reese Perry to be 7 feet thick with 2 to 3 inches of shale parting near the middle.

On Rich Creek, emptying into Guyandot River from the south, some prospects have been made in the Cedar Grove Coal. At one of these, Hennen obtained the following:

Coal Opening—No. 497 on Map II.

On Rich Creek, at the mouth of Pit Branch, 2.8 miles southwest of Manbar; **Cedar Grove Coal**; elevation, 1225′ B.

			Feet	Inches
Shale, greenish gray			3	0
Coal, gas	1′	4″		
Coal, splint	2	8½	4	0½
Slate				

Another opening, examined by Hennen farther up the creek, shows the following:

Coal Opening—No. 498 on Map II.

On Rich Creek, at the mouth of Spring Branch, 4 miles southwest of Man; **Cedar Grove Coal**; elevation, 1265′ B.

			Feet	Inches
Shale, sandy and flaggy			6	0
Coal	0′	0⅛″		
Shale, gray	0	5		
Coal, gas	1	6		
Coal, splinty	3	0	4	11⅛
Fire clay, concealed, and sandstone, to Lower Cedar Grove			35	0

One opening in the Cedar Grove Coal was found on Huff Creek by Hennen, where the following section was secured:

Coal Opening—No. 499 on Map II.

On Huff Creek, 0.3 mile south of Cyclone; **Cedar Grove Coal**; elevation, 1490′ B.

			Feet	Inches
Shale, dark, bluish			2	0
Coal, gas	1′	3″		
Coal, splinty	2	9	4	0
Fire clay				

One opening was found by Hennen on Elk Creek, as follows:

Coal Opening—No. 500 on Map II.

On Elk Creek, 1.8 miles northeast of Christian; Cedar Grove Coal; elevation, 1495′ B.

			Feet	Inches
Shales, dark			7	0
Coal, gas, soft	2′	11″		
Shale, gray	0	2		
Coal, semi-splint	3	9	6	10
Slate				

Harvey District, Mingo County.

In Harvey District, the Cedar Grove Coal is not above drainage at any point. On the summit of the Warfield Anticline at Dingess, the coal is under the bed of Twelvepole Creek by 50 to 60 feet, and is reported 1 foot thick in the section for that point published in Chapter IV. No other borings have pierced the horizon in the district, but the absence of the coal in Chapmanville District, Logan County, on the northeast, and the poor character of its most western outcrop in Logan District on the east, and in Warfield District, Mingo County, on the southwest, and in the Naugatuck borings on the south, indicate that little Cedar Grove Coal of value will be found in Harvey District.

Warfield District, Mingo County.

Warfield District, like Harvey, is situated in the region of westward thinning of the Kanawha Coals. Map II shows that the Cedar Grove Coal is above drainage in the Kermit region along the Warfield Anticline, but diligent search failed to find any coal of consequence, the horizon being occupied mostly by slate and shale with thin streaks of coal, and the gas wells drilled throughout the district do not show this coal, so that it does not likely exist in minable quantity in Warfield District.

Hardee District, Mingo County.

In Hardee District, the Cedar Grove Coal lies under drainage in many localities, making it impossible to know definitely what thickness it has in these regions.

At Naugatuck, however, the record of Coal Test Boring No. 154, which is used in the section for Naugatuck, published in Chapter IV, page 70, shows the coal to be only 1 foot thick. Borings Nos. 153 and 155, published in the present Chapter, do not record it at all.

The following exposure was examined by Reger in a ravine:

Coal Exposure—No. 501 on Map II.

On Right Fork of Laurel Fork of Pigeon Creek, 2.8 miles N. 80° E. of Canterbury; **Cedar Grove Coal**; elevation, 850′ B.

			Feet	Inches
Sandstone, massive			30	0
Coal	0′	3″		
Fire clay	2	0		
Coal, slaty	0	3		
Shale, gray	0	2		
Coal	0	3		
Slate, black, with coal streaks	0	8	3	7
Fire clay, gray				

The following opening, examined by Reger, seems to represent the Cedar Grove Coal, but it may be the Williamson:

Coal Opening—No. 502 on Map II.

On Spruce Fork of Laurel Fork of Pigeon Creek, 1.5 miles northwest of Canterbury; **Cedar Grove Coal**; elevation, 750′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	2½″		
Slate, black	0	0½		
Coal, soft	1	7		
Slate	0	2		
Coal, splint	1	6	3	6
Fire clay				

At **Exposure No. 503 on Map II,** on Trace Fork of Pigeon Creek, 2.5 miles S. 80° W. of Myrtle, Reger observed 1′ 9″ of clean coal along the creek bank, but the bottom was concealed by water.

Three other openings examined by Reger in the same vicinity show the following:

Coal Opening—No. 504 on Map II

On Trace Fork of Pigeon Creek, 2.1 miles S. 85° W. of Myrtle; **Cedar Grove Coal**; elevation, 666′ L.

	Feet	Inches
Sandstone, massive		
Shale	5	0
Coal	2	2
Fire clay, concealed, and sandstone to creek	6	0

Coal Opening—No. 505 on Map II.

On Trace Fork of Pigeon Creek, 1.8 miles southwest of Myrtle; **Cedar Grove Coal**; elevation, 680′ B.

	Feet	Inches
Shale, sandy		
Shale, ferriferous	1	0
Coal	2	0
Fire clay		

Silas Ooten Farm Mine—No. 506 on Map II.

On Trace Fork of Pigeon Creek, 1.3 miles southwest of Myrtle; **Cedar Grove Coal**; elevation, 700′ B.

		Feet	Inches
Shale, dark			
Coal, semi-splint	1′ 3″		
Coal, splint	1 3	2	6
Shale and concealed to creek		15	0

Lee District, Mingo County

In Lee District, the Cedar Grove Coal again becomes an important coal, as it shows a good mining section at numerous points.

In Chapter IV, it is noted in the sections for Ragland, Rawl, Sprigg, and Little Coon Knob.

In the northern end of the district, the Cedar Grove Coal comes above drainage on the southeastward rise of the strata along Pigeon Creek, about one-half mile above the mouth of Trace Fork. An opening examined by Hennen a mile farther up shows the following:

Coal Opening—No. 507 on Map II.

On Pigeon Creek, 2.8 miles southwest of Myrtle; **Cedar Grove Coal;** elevation, 725′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	10″		
Coal, splint	1	1	1	11
Shale				

Another opening a short distance farther up shows the following, according to Hennen:

Coal Opening—No. 508 on Map II.

On Pigeon Creek, 2.9 miles southwest of Myrtle; **Cedar Grove Coal;** elevation, 715′ B.

			Feet	Inches
Shale, sandy			12	0
Slate, black			2	0
Coal, gas	1′	0″		
Coal, splint	2	0	3	0
Slate				

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 509 on Map II.

On Pigeon Creek. 2.8 miles northwest of Burch; **Cedar Grove Coal;** elevation, 720′ B.

			Feet	Inches
Sandstone, massive, great cliff, Upper Cedar Grove			40	0
Shale, flaggy, sandy and dark			15	0
Coal, gas	1′	1″		
Coal, splint	2	1	3	2
Slate				

Farther up the following was obtained by Hennen:

Coal Opening—No. 510 on Map II.

On Pigeon Creek, 2.3 miles northwest of Burch; **Cedar Grove Coal;** elevation, 730′ B.

			Feet	Inches
Shale, sandy			6	0
Coal, gas	1′	0½″		
Coal, splint	1	8½	2	9
Shale				

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 511 on Map II.

On Pigeon Creek, 1 mile northwest of Burch; **Cedar Grove Coal**; elevation, 765′ B.

			Feet	Inches
Sandstone, massive			15	0
Shale, sandy			14	0
Slate			6	0
Shale, dark, flaggy			10	0
Coal, gas	0′	11″		
Coal, splint	2	1	3	0
Slate				

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 512 on Map II.

On Pigeon Creek, 0.4 mile northwest of Burch; **Cedar Grove Coal**; elevation, 815′ B.

			Feet	Inches
Shale, dark, laminated			15	0
Coal, gas	0′	8″		
Coal, splint	1	10	2	6
Slate				

An opening examined by Gawthrop shows the following:

Coal Opening—No. 513 on Map II.

On Pigeon Creek, at Burch; **Cedar Grove Coal**; elevation, 815′ B.

			Feet	Inches
Shale			3	0
Coal, gas	0′	11″		
Coal, hard	2	0	2	11
Shale				

Another opening, examined by Gawthrop on a stream tributary to Pigeon, shows the following:

Coal Opening—No. 514 on Map II.

On Hell Creek, 3 miles northwest of Burch; **Cedar Grove Coal**; elevation, 725′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	1′	0″		
Coal, hard, visible	1	2	2	2
Concealed				

The following opening, examined by Gawthrop, is in the same region:

Coal Opening—No. 515 on Map II.

On Pigeon Creek, 2.2 miles north of Burch; **Cedar Grove Coal;** elevation, 750′ B.

			Feet	Inches
Shale, sandy				
Coal, soft	1′	3″		
Coal, harder	1	3	2	6

On Elk Creek, which empties into Pigeon 1.5 miles north of Burch, the two following openings were observed by Gawthrop:

Coal Opening—No. 516 on Map II.

On Elk Creek, 1.6 mile west of Bias; **Cedar Grove Coal;** elevation, 773′ B.

			Feet	Inches
Sandstone, shaly			6	0
Coal, gas	1′	4″		
Coal, hard	1	10	3	2
Shale				

Coal Opening—No. 517 on Map II.

On Elk Creek, 1.2 miles west of Bias; **Cedar Grove Coal;** elevation, 785′ B.

			Feet	Inches
Sandstone, massive			10	0
Shale, gray, sandy			20	0
Coal, gas	1′	6″		
Coal, harder	0	11		
Bone	0	1		
Coal	0	6	3	0
Shale				

At **Opening No. 518 on Map II,** where the coal goes under drainage along Elk Creek, 0.9 mile west of Bias, at an elevation of 790′ B., Gawthrop observed 2 feet of coal above the water.

The Cedar Grove Coal is mined for local use along Rockhouse Fork, which empties into Pigeon at Burch. At **Opening No. 519 on Map II,** at the mouth of Upper Curry Branch, 0.6 mile southwest of Ragland, 4′ 7″ of coal was observed by Reger, as noted in the section for Ragland, published in Chapter IV.

The following opening was examined by Reger:

United Thacker Coal Co. Farm Mine—No. 96 on Map II.

On Rockhouse Fork of Pigeon Creek, 0.5 mile west of Ragland; **Cedar Grove Coal**; elevation, 835' B.

				Feet	Inches
1.	Sandstone, massive, making cliff			20	0
2.	Coal			1	0
3.	Concealed and shale			15	0
4.	Coal, semi-splint	1'	2"		
5.	Coal, splint	1	6		
6.	Coal, semi-splint	1	6	4	2
7.	Shale and sandstone to creek			5	0

A sample was collected from Nos. 4, 5 and 6 of section, the composition of which is published under Mine No. 96 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur, and phosphorus.

A short distance farther up, the coal is mined by stripping in the bed of the fork. Only 2 feet of coal was visible where examined by Reger, but the section was reported by the owner as follows:

Lewis Varney Coal Stripping—No. 520 on Map II.

On Rockhouse Fork, 0.3 mile west of Ragland; **Cedar Grove Coal**; elevation, 840' B.

			Feet	Inches
Coal, splint	2'	0"		
Slate	0	1		
Coal	2	0	4	1

The following opening was examined by Reger:

Coal Prospect—No. 521 on Map II.

On Rockhouse Fork of Pigeon Creek, 3.2 miles southeast of Ragland; **Cedar Grove Coal**; elevation, 1060' B.

			Feet	Inches
Sandstone, shaly				
Coal	0'	2"		
Shale	0	6		
Coal	0	6	1	2
Shale, to creek				

On Pigeon Creek above Burch, the Cedar Grove Coal has been opened at numerous points. At one of these, Gawthrop obtained the following:

Coal Opening—No. 522 on Map II.

On Pigeon Creek, 0.8 mile south of Burch; **Cedar Grove Coal**; elevation, 830′ B.

			Feet	Inches
Shale, dark, flaggy			8	0
Coal, gas	0′	9″		
Coal, splint	1	8	2	5
Shale and concealed				

Another opening examined by Gawthrop, shows the following:

Coal Opening—No. 523 on Map II.

On Pigeon Creek. 1.6 miles south of Burch; **Cedar Grove Coal**; elevation, 855′ B.

			Feet	Inches
Shale, dark			15	0
Coal, gas	1′	0″		
Coal, splint, visible	1	0	2	0
Concealed				

The three following openings, examined by Gawthrop show a fair thickness of coal:

Coal Opening—No. 524 on Map II.

On Pigeon Creek, 2 miles south of Burch; **Cedar Grove Coal**; elevation, 860′ B.

			Feet	Inches
Shale, dark			10	0
Coal, gas	1′	0″		
Coal, splint	2	0		
Shale	0	0¾		
Coal, visible	0	2	3	2¾
Concealed				

Coal Opening—No. 525 on Map II.

On Pigeon Creek, 2.2 miles south of Burch; **Cedar Grove Coal;** elevation, 860′ B.

			Feet	Inches
Shale, dark gray			15	0
Coal, gas	1′	0″		
Coal, splint	2	0		
Shale, gray	0	0½		
Coal, soft, visible	0	3	3	3½
Concealed by water				

Coal Opening—No. 526 on Map II.

On Evans Ferrell Branch of Pigeon Creek, 2.5 miles S. 15° E. of Burch; **Cedar Grove Coal;** elevation, 860′ B.

			Feet	Inches
Sandstone			10	0
Coal, rider			1	0
Shale, sandy			22	0
Coal, gas	1′	2″		
Coal, splint	2	0		
Coal, hard, visible	0	6	3	8
Concealed				

Prospect No. 527 on Map II, on Buffalo Creek, 3 miles N. 85° E. of Chattaroy, at an elevation of 855′ B., had fallen shut when examined by Gawthrop, but was reported 3 feet thick.

At **Prospect No. 528 on Map II,** on Buffalo Creek, 3 miles east of Chattaroy, Gawthrop observed 2′ 2″ of coal, at an elevation of 890′ B.

The following opening, near Tug Fork, had fallen shut when examined by Hennen, but was reported as follows by N. H. Manakee:

Coal Opening—No. 529 on Map II .

On Dick Williamson Branch of Tug Fork, 0.5 mile north of Rawl; **Cedar Grove Coal;** elevation, 865′ B.

			Feet	Inches
Slate, gray, yellowish			6	0
Coal, splinty	3′	0″		
Slate, shale and sandstone, with coal streaks	7	0		
Coal, splinty	1	6	11	6
Slate				

Williamson District, Mingo County.

In Williamson District, the Cedar Grove Coal was not observed. The presence of the Buffalo Creek and Williamson Coals in better development has probably discouraged much prospecting in the Cedar Grove.

Magnolia District, Mingo County.

In Magnolia, the Cedar Grove Coal has been prospected and mined more extensively than in any other district in the two counties except Logan, and is locally known as the "Red Jacket" or "Upper Thacker" bed. It is a fine coal and has long been valued highly for steam and domestic fuel.

Several openings have been made in the northern part of the district, along Pigeon Creek. The following was examined by Gawthrop:

Coal Prospect—No. 530 on Map II.

On a branch of Pigeon Creek, 2.7 miles southwest of Varney; **Cedar Grove Coal**; elevation, 975′ B.

			Feet	Inches
Shale, gray			1	0
Coal, gas	1′	1″		
Slate	0	0¾		
Coal, hard	1	11	3	0¾

The following opening farther up the creek was examined by Gawthrop:

Coal Prospect—No. 531 on Map II.

On Pigeon Creek, 1.3 miles southwest of Varney; **Cedar Grove Coal**; elevation, 990′ B.

			Feet	Inches
Shale, dark gray			10	0
Coal, gas	1′	9″		
Coal, hard	2	0	3	9
Fire clay				

The following opening was examined by Gawthrop:

Coal Opening—No. 532 on Map II.

On Pigeon Creek, at Varney; **Cedar Grove Coal**; elevation, 1005′ B.

			Feet	Inches
Shale, dark, sandy			15	0
Coal, gas	1′	6″		
Coal, splint	1	10	3	4
Concealed by water				

The following opening was examined by Hennen:

Coal Opening—No. 533 on Map II.

On Pigeon Creek, 0.4 mile southwest of Varney; **Cedar Grove Coal**; elevation, 1050′ B.

			Feet	Inches
Shale, sandy			10	0
Coal, gas	1′	1″		
Coal, splint	1	4		
Coal, splinty	1	5		
Shale, gray, coaly at top	2	0		
Coal, slaty	0	4	6	2
Shale, gray				

The following opening was examined by Hennen:

Coal Opening—No. 534 on Map II.

On Pigeon Creek, 1.1 miles southeast of Varney; **Cedar Grove Coal**; elevation, 1095′ B.

				Feet	Inches
Sandstone, massive				5	0
Coal, gas	0′	2½″	Rider	1	7½
Coal, slaty	0	5			
Coal, gas	1	0			
Fire clay				1	0
Shale, sandy and flaggy				22	0
Coal, gas	1′	3″			
Coal, splint	2	9		4	0
Shale					

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 535 on Map II.

On Pigeon Creek, at Musick; **Cedar Grove Coal**; elevation, 1165′ B.

			Feet	Inches
Sandstone, massive, gray			5	0
Shale, gray			2	8
Coal, gas, hard	1′	2″		
Coal, splint	2	0	3	2
Slate				

Three other openings above Musick, examined by Hennen, show the following:

Coal Opening—No. 536 on Map II.

On Pigeon Creek, 0.4 mile east of Musick; **Cedar Grove Coal**; elevation, 1185′ B.

			Feet	Inches
Sandstone, massive			20	0
Coal, gas	1′	0″		
Coal, splint	2	0	3	0
Slate				

Coal Opening—No. 537 on Map II.

On Pigeon Creek, 0.6 mile east of Musick; **Cedar Grove Coal**; elevation, 1190′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas, hard	0′	6″		
Coal, splint	2	8	3	2
Slate				

Coal Opening—No. 538 on Map II.

On Pigeon Creek, 0.8 mile east of Musick; **Cedar Grove Coal**; elevation, 1200′ B.

	Feet	Inches
Sandstone, massive	5	0
Shale, sandy	3	0
Coal	2	8
Slate		

The following was obtained by Hennen where the coal goes under drainage:

Coal Exposure—No. 539 on Map II.

On Pigeon Creek, 1.1 miles east of Musick; **Cedar Grove Coal**; elevation, 1205′ B.

	Feet	Inches
Sandstone, massive		
Coal, splinty	2	3
Fire clay shale	1	3

The Cedar Grove Coal is mined extensively along Mate Creek, which is south of Pigeon. The following mine in this bed was examined and sampled by Hennen and the results published in Volume II (A), page 412, of the State Survey Reports. The coal was classified doubtfully as the "**Thacker**" or **Cedar Grove**:

Marvin Coal Co. Mine—No. 97 on Map II.

On Tug Fork, 0.5 mile north of Matewan; **Cedar Grove Coal**; elevation, 1090′ B.

				Feet	Inches
1.	Sandstone				
2.	Coal, semi-splint	1′	1″		
3.	Coal, gray splint	1	11½	3	0½
4.	Slate				

"Principal office, Matewan; faces, irregular; greatest rise, southeast; mine capacity, 40 tons; men employed, 8; authority for mine data, John W. Stewart, Mine Foreman; sample from Nos. 2 and 3 for analysis."

The composition of this sample is published under Mine No. 97 in the table at the end of this Chapter.

The following mine is just above Mate Creek:

Magnolia Coal & Coke Co. Mine—No. 98 on Map II.

On Sulphur Creek, 0.5 mile southeast of Matewan; **Cedar Grove Coal**; elevation, 1150′ B.

				Feet	Inches
1.	Shale, gray				
2.	Coal, gas	0′	8″		
3.	Coal, splint	0	2		
4.	Coal, gas, hard	0	9⅜		
5.	Coal, splint	1	3		
6.	Sulphur streak	0	0⅛		
7.	Coal, splint	0	4		
8.	Coal, gas, hard	1	2½	4	5
9.	Shale				

"Coal owned by Sam Simpkins et al.; principal office, Matewan; daily capacity, 150 tons; daily output, 150 tons; 30 laborers and miners employed; gasoline motor and mule haulage; used for steam and domestic fuel; shipped east and west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 3, 4, 5, 7 and 8 of section, in Room No. 41 off Main Entry, by R. M. Gawthrop; S. T. Lambert, Superintendent, authority for data."

The composition of this sample is published under Mine No. 98 in the table at the end of this Chapter.

The following mine in the Cedar, Grove, located on the opposite side of Sulphur Creek, was examined and sampled by Hennen and the results published in Volume II (A), page 413, of the State Survey Reports, classified under the local name of **"Thacker"**:

Mate Creek Coal Co. Mine—No. 99 on Map II.

On Sulphur Creek, 0.7 mile south of Matewan; **Cedar Grove Coal**; elevation, 1185′ B.

			Feet	Inches
1.	Slate, good roof			
2.	Coal, gas	1′ 2″		
3.	Coal, gray splint	3 1	4	3
4.	Slate and concealed to Alma Coal		135	0

"Principal office, Matewan; faces, irregular, greatest rise, southeast; mine capacity, 100 tons; men employed, 25; coal shipped east and west for steam purposes; authority for mine data, S. T. Lambert, Superintendent; sample collected from Nos. 2 and 3 for analysis."

The composition of this sample is published under Mine No. 99 in the table at the end of this Chapter.

The **Red Jacket Consolidated Coal & Coke Co., Logan Mine, (No. 100 on Map II)**, on Mate Creek, at Red Jacket, was examined and sampled, and the results published in Volume II, page 547, of the State Survey Reports, under the name of the **Logan Consolidated Coal Co.**, the coal being classified as the **"Thacker,"** which must be abandoned for **"Cedar Grove."** The coal was reported 4′ 7″ thick at an elevation of 1080′ B. The composition of the sample is published under Mine No. 100 in the table at the end of this Chapter.

The **Red Jacket Consolidated Coal & Coke Co., Red Jacket Mine, (No. 101 on Map II)**, on Mate Creek, 0.7 mile northeast of Red Jacket, at an elevation of 1045′ B., was examined and sampled and the results published in Volume II, page 547, of the State Survey Reports, under the name of the Red Jacket

Mine of the Logan Consolidated Coal Co., the coal being classified locally as the "Thacker," but it should be called the **Cedar Grove**. The coal was reported 4′ 8″ thick. The composition of the sample is published under Mine No. 101 in the table at the end of this Chapter.

The following mine is in the same region:

Red Jacket Consolidated Coal & Coke Co., Mitchell Mine—
No. 102 on Map II.

On Mitchell Branch of Mate Creek, 2.6 miles northeast of Matewan; **Cedar Grove Coal**; elevation, 1096′ L.

				Feet	Inches
1.	Shale, bluish gray			10	0
2.	Coal, semi-splint	0′	4″		
3.	Coal, gas, hard	0	8⅝		
4.	Coal, gray splint	0	2		
5.	Coal, gas	0	8		
6.	Sulphur streak	0	0⅛		
7.	Coal, splint	1	5		
8.	Coal, gas, hard	1	1	4	4½
9.	Slate				

"Coal owned by Red Jacket Consolidated Coal & Coke Co.; principal office, Red Jacket; daily capacity, 5,000 tons; daily output, 1,500 tons; 50 laborers and 90 miners employed; electric haulage; coal used for steam, domestic and furnace fuel; shipped east and west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 3, 4, 5, 7 and 8 of section, in Room No. 15 off 2nd Left Entry, by R. M. Gawthrop; W. A. Wilson, Superintendent, authority for data."

The composition of this sample is published under Mine No. 102 in the table at the end of this Chapter.

The following mine is farther up the creek:

Red Jacket Jr. Coal Co., Red Jacket Jr. Mine—
No. 103 on Map II.

On Mate Creek, 3.2 miles northeast of Matewan; **Cedar Grove Coal**; elevation, 1054′ L.

				Feet	Inches
1.	Shale, dark gray, silicious			15	0
2.	Coal, gas	0′	5½″		
3.	Slate, ¼″ to	0	0⅛		
4.	Coal, gas	1	1½		
5.	Coal, splint	1	1½		
6.	Bone	0	0¼		
7.	Coal, gas, hard	1	3⅛	4	0
8.	Shale				

"Coal owned by United Thacker Coal Co.; principal office, Red Jacket; daily capacity, 1,500 tons; daily output, 900 tons; 40 laborers and 65 miners employed; electric haulage; used for steam, domestic and furnace fuel; shipped east and west, principally west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 5 and 7 of section in No. 6 Right Heading, off No. 2 Main, by R. M. Gawthrop; W. A. Wilson, Superintendent, authority."

The composition of the sample is published under Mine No. 103 in the table at the end of this Chapter.

The following opening was examined by Hennen farther up the creek:

Coal Opening—No. 540 on Map II.

On Straight Fork of Mate Creek, 0.5 mile northwest of Meador; **Cedar Grove Coal**; elevation, 1295′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	1′	1″		
Coal, splint	1	6		
Coal, gas	1	0	3	7
Slate, gray				

Another opening, examined by Hennen in the same region, shows the following:

Coal Opening—No. 541 on Map II.

On Mate Creek, at Meador; **Cedar Grove Coal**; elevation, 1310′ B.

	Feet	Inches
Sandstone, massive	5	0
Shale, sandy	1	3
Coal, gas, medium hard	4	0
Slate		

The following opening was examined by Hennen:

Coal Opening—No. 542 on Map II.

On Mate Creek, 1.3 miles east of Meador; **Cedar Grove Coal**; elevation, 1370′ B.

			Feet	Inches
Sandstone, flaggy			5	0
Coal, gas	0′	11″		
Coal, splinty	2	0	2	11
Slate				

The following mine in the Cedar Grove was examined and sampled by A. P. Brady and the results published in Volume

II, page 547, of the State Survey Reports, under the name of the Lynn Coal & Coke Co., the coal being classified locally as the **"Thacker"**:

Red Jacket Consolidated Coal & Coke Co. Mine (Abandoned)—No. 104 on Map II.

On Tug Fork at Lynn; Cedar Grove Coal; elevation, 1235′ B.

		Feet	Inches
1.	Sandstone		
2.	Coal, "Rider"	1	6
3.	Slate	10	0
4.	Coal	4	5
5.	Fire clay		

A sample was collected from No. 4 of section, the composition of which is published under Mine No. 104 in the table at at the end of this Chapter.

On Thacker Creek, the next important tributary of Tug Fork on the West Virginia side, the Cedar Grove Coal is mined extensively. The following was a commercial mine in the Cedar Grove, now abandoned, near the mouth of the creek. It was examined and sampled by S. D. Brady and the results published in Volume II, page 545, of the State Survey Reports, under the name of the Maritime Mine of the Logan Consolidated Coal Co., the coal being classified locally as the **"Thacker"**:

Red Jacket Consolidated Coal & Coke Co., Maritime Mine (Abandoned)—No. 105 on Map II.

On Thacker Creek, 0.3 mile northeast of Thacker; Cedar Grove Coal; elevation, 1250′ B.

		Feet	Inches
Sandstone			
Coal, "Rider"		1	2
Slate		8	0
Draw slate			
Coal, soft	1′ 10″		
Coal, splint	1 8		
Coal, soft	1 0		
Slate	?		
Coal	?	4	6

"Greatest rise, southeast; the lower half of the coal is not taken out at this opening, the parting slates being too thick."

The composition of the sample is published under Mine No. 105 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by A. P. Brady, and the results published in Volume II, page 544, of the State Survey Reports, the coal being classified as the **"Thacker"**. The mine has been worked out and abandoned:

Thacker Coal & Coke Co. Mine (Abandoned)—
No. 106 on Map II.

On Thacker Creek, 0.5 mile east of Thacker; **Cedar Grove Coal**; elevation, 1300′ B.

			Feet	Inches
Sandstone				
Slate			0	8
Sandstone			1	6
Draw slate			1	8
Coal	4′	8″		
Slate	0	0½		
Coal	0	11		
Slate	0	1½		
Coal	0	8		
Slate	0	1		
Coal	1	6	8	0

"Greatest rise, southeast."

The composition of the sample is published under Mine No. 106 in the table at the end of this Chapter.

The following section was examined by Hennen at one of the numerous openings of the Thacker Coal & Coke Co. No. 2 Mine. This opening is almost worked out and was not sampled:

Thacker Coal & Coke Co., No. 2 Mine—No. 543 on Map II.

On Thacker Creek, 0.3 mile southwest of Thacker Mines; **Cedar Grove Coal**; elevation, 1305′ B.

			Feet	Inches
Shale				
Coal, gas	2′	5″		
Coal, splint, hard	2	8		
Shale, gray, 1½″ to	0	2		
Coal, splint	0	10		
Slate, gray	0	1		
Coal, gas	0	8		
Slate, gray	0	0½		
Coal, gas	0	4		
Slate, gray	0	0½		
Coal, gas	1	8	8	11
Concealed by water				

The two following mines are different openings of the No. 2 Plant of the same Company:

Thacker Coal & Coke Co., Mine No. 9 of No. 2 Plant—
No. 107 on Map II.

On Thacker Creek, 1 mile east of Thacker Mines; **Cedar Grove Coal**; elevation, 1315′ B.

				Feet	Inches
1.	Shale, gray, silicious				
2.	Coal, gas	1′	2″		
3.	Bone, 0″ to	0	1		
4.	Coal, gas	0	11		
5.	Coal, semi-splint	1	6		
6.	Slate, black, 2″ to	0	0½		
7.	Coal, gas	1	4½	5	1
8.	Shale				

"Coal owned by Thacker Coal & Coke Co.; principal office, Cincinnati, Ohio; daily capacity, 2,000 tons; daily output, 1,000; 75 laborers and 75 miners employed; mule and electric haulage; used for steam, gas and domestic fuel; shipped east and west, mostly west; no regular butts or faces; greatest rise, S. 45° E.; the above data are for openings Nos. 2, 3, 6, 8 and 9; they are all dumped at the same tipple; sample collected from Nos. 2, 4, 5 and 7 of section, in No. 11 Left Heading, by R. M. Gawthrop; J. M. Lewis, Superintendent, authority for data."

The composition of this sample is published under Mine No. 107 in the table at the end of this Chapter.

Thacker Coal & Coke Co., Mine No. 6 of No. 2 Plant—
No. 108 on Map II.

On Thacker Creek, 0.7 mile southeast of Thacker Mines; **Cedar Grove Coal**; elevation, 1320′ B.

				Feet	Inches
1.	Shale, gray, silicious				
2.	Coal, gas	1′	2″		
3.	Bone	0	1½		
4.	Coal, gas	1	10		
5.	Coal, semi-splint	1	2		
6.	Slate, 6″ to	0	3		
7.	Coal, gas	1	8	6	2½
8.	Shale				

"Sample collected from Nos. 2, 4, 5 and 7 of section in Room No. 9 off Main Air Course, by R. M. Gawthrop; J. M. Lenoir, Superintendent, authority. See Mine No. 9 (No. 107 on Map II) for additional data."

The composition of this sample is published under Mine No. 108 in the table at the end of this Chapter.

On Grapevine Creek, the next West Virginia tributary of Tug Fork, the Cedar Grove Coal is also mined. The following mine in the Cedar Grove was examined and sampled by S. D. Brady and the results published in Volume II, page 545, of the State Survey Reports, under the name of the Logan Consolidated Coal Co., "Lick Fork" Mine, the coal being classified locally as the **"Thacker."** The mine is now worked out and abandoned:

Red Jacket Consolidated Coal & Coke Co., Lick Fork Mine (Abandoned)—No. 109 on Map II.

On Grapevine Creek, 1.3 miles southeast of Thacker; **Cedar Grove Coal**; elevation, 1359' L.

			Feet	Inches
Sandstone				
Slate				
Coal, soft	1'	1"		
Splint	2	0		
Coal, soft	1	2		
Splint	1	7		
Coal, soft	0	3		
Bone	0	0½		
Splint	0	3		
Coal, soft	1	3		
Splint	0	2½		
Coal, soft	1	0	8	10
Coal, reported			4	0

"Greatest rise, southeast."

The composition of this sample is published under Mine No. 109 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by S. D. Brady and the results published in Volume II, page 546, of the State Survey Reports, under the name of Grapevine Coal Co., the coal being classified locally as the **"Thacker"**:

Red Jacket Consolidated Coal & Coke Co., Grapevine Mine—No. 110 on Map II.

On Tug Fork, 1 mile N. 80° E. of Delorme; **Cedar Grove Coal**; elevation, 1405′ B.

			Feet	Inches
Splint and soft coal, mixed	4′	9″		
Bone	0	0½		
Coal	2	2		
Slate	0	7		
Coal, soft	0	6		
Slate, black	0	1		
Coal	0	1		
Slate, black	0	1		
Coal	0	3		
Slate	0	0½		
Coal	1	10		
Slate	0	2		
Coal	1	6		
Slate	0	0¼		
Coal	0	6	12	7½

"Greatest rise, southeast."

The composition of this sample is published under Mine No. 110 in the table at the end of this Chapter.

The following mine in the Cedar Grove was examined and sampled by Hennen and the results published in Volume II(A), page 413, of the State Survey Reports under the name of the Thacker Fuel Co., the coal being classified as **"Thacker"**:

Thacker Coal & Coke Co., No. 10 Mine—No. 111 on Map II.

On Grapevine Creek, at New Thacker; **Cedar Grove Coal**; elevation, 1480′ B.

			Feet	Inches
1. Slate, good roof				
2. Coal, gas	2′	4″		
3. Coal, gray splint	1	11		
4. Bone, 1″ to	0	0½		
5. Coal, gray splint	0	5		
6. Coal, gas, hard	2	3	6	11½
7. Slate				

"Principal office, Cincinnati, Ohio; faces, irregular; greatest rise, southeast; mine capacity, 350 tons; men employed, 45; coal, 'run of mine,' shipped mostly west, some east, for steam and domestic purposes; authority for mine data, H. C. Boyd, Mine Foreman; sample from Nos. 2, 3, 4, 5, and 6 for analysis."

The composition of this sample is published under Mine No. 111 in the table at the end of this Chapter.

The following is another mine of the same Company:

Thacker Coal & Coke Co., Mine No. 14 of No. 11 Plant— No. 112 on Map II.

On Grapevine Creek, 1.0 mile northeast of New Thacker; **Cedar Grove Coal**; elevation, 1450′ B.

				Feet	Inches
1.	Shale, gray, silicious				
2.	Coal, gas	0′	7″		
3.	Bone	0	2		
4.	Coal, gas	0	6		
5.	Slate, black, ⅛″ to	0	0¼		
6.	Coal, gas	0	6¼		
7.	Coal, semi-splint	0	11		
8.	Bone	0	1½		
9.	Coal, semi-splint	0	7½		
10.	Slate	0	0½		
11.	Coal, semi-splint	0	8		
12.	Coal, gas	0	6	4	8
13.	Shale				

"Coal owned by Thacker Coal & Coke Co.; principal office, Cincinnati, Ohio; daily capacity, 3,000 tons; daily output, 400 tons; 84 laborers and 72 miners employed; mule and electric haulage used in mine, steam on the outside; used for steam, gas and domestic fuel; shipped east and west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 6, 7, 9, 11 and 12 of section. in No. 2 Room off 4th Left Heading, by R. M. Gawthrop; J. M. Lewis, Superintendent, authority for data."

The composition of this sample is published under Mine No. 112 in the table at the end of this Chapter.

The Cedar Grove Coal was observed by Gawthrop on Grapevine Fork of Beech Creek, 2.6 miles southwest of Hinch, at **Prospect No. 544 on Map II,** at an elevation of 1420′ B. The opening had fallen partly shut, but the height from the bottom of the vein at the mouth of the prospect to the top of the coal at the face was 3′ 6″, which presumably shows the thickness of the coal.

The following opening near the head of the same creek, examined by Hennen, shows the following:

Coal Opening—No. 545 on Map II.

On Beech Creek, 0.5 mile northwest of Hinch; **Cedar Grove Coal**; elevation, 1440′ B.

			Feet	Inches
Sandstone, shaly			2	0
Coal, gas	1′	0″		
Coal, splinty	3	9	4	9
Slate				

Stafford District, Mingo County.

In Stafford District, the Cedar Grove Coal has not been mined commercially, but several prospects were observed which indicate that the coal is usually of good thickness and quality. Map II shows that it is high in the hills and almost disappears above them in the eastern end of the district.

In Chapter IV, the coal is noted in the section for War Eagle, and in Chapter VI, it is recorded in that for Browning Fork.

The Cedar Grove Coal was once opened at **Prospect No. 546 on Map II** on Lefthand Fork of Bens Creek, 1.6 miles southwest of Domestic, at an elevation of 1485′ B., but the opening had fallen shut when visited by Hennen and the thickness could not be obtained.

The following opening, examined by Gawthrop in the same region, shows good coal:

Coal Opening—No. 547 on Map II.

On Left Fork of Bens Creek, 0.3 mile southeast of Domestic; Cedar Grove Coal; elevation, 1515′ B.

			Feet	Inches
Shale, gray			6	0
Coal, gas	2′	6″		
Coal, bony	0	3		
Coal, gas	1	7		
Coal, splint	1	4	5	8
Shale				

An opening farther down the same stream, examined by Hennen, shows the following:

Coal Opening—No. 548 on Map II.

On Left Fork of Bens Creek, 1.3 miles northeast of Beech Creek; Cedar Grove Coal; elevation, 1600′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, sandy, dark			8	0
Coal, gas	1′	0″		
Coal, semi-splint	4	7	5	7
Slate				

The following prospect was examined by Gawthrop farther east:

Coal Prospect—No. 549 on Map II.

On Bens Creek at Twisted Gun Gap; Cedar Grove Coal; elevation, 1710′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	2′	4″		
Coal, harder	3	10	6	2
Shale				

At **Prospect No. 550 on Map II,** on Righthand Fork of Bens Creek, 2.7 miles northeast of War Eagle, the Cedar Grove Coal is 9′ 1″ thick, almost free from slate, as shown in the section for War Eagle in Chapter IV.

In the northern part of Stafford District, on the Guyandot River, the coal has been opened at several points.

Prospect No. 551 on Map II, on Harry Branch of Guyandot River, 1.9 miles northeast of Gilbert, at an elevation of 1790′ B., was fallen shut when examined by Gawthrop and the thickness could not be measured.

The following prospect was examined by Gawthrop:

Coal Prospect—No. 552 on Map II.

On Henry Branch of Browning Fork of Horsepen Creek, 2.3 miles northwest of Horsepen; Cedar Grove Coal; elevation, 1515′ B.

			Feet	Inches
Shale				
Coal, rotten	1′	6″		
Slate	0	1		
Coal, visible	3	0	4	7
Concealed by water				

The following opening was examined by Hennen:

Coal Opening—No. 553 on Map II.

On Browning Fork of Horsepen Creek, 4.4 miles northwest of Horsepen; Cedar Grove Coal; elevation, 1370′ B.

			Feet	Inches
Shale, sandy, flaggy			7	0
Coal, gas	4′	9″		
Shale, gray	1	4		
Coal, gas	1	3	7	4
Slate, concealed and shale and middle bench of coal			12	0

The five following openings were examined by Gawthrop:

Coal Prospect—No. 554 on Map II.

On Horsepen Creek, 2 miles northwest of Horsepen; **Cedar Grove** Coal; elevation, 1545′ B.

			Feet	Inches
Coal, soft, with black seams	1′	3″		
Coal, gas, visible	3	0	4	3
Concealed				

The coal at this prospect was reported by residents to be 9′ 4″ thick with a 6″ shale parting.

Coal Opening—No. 555 on Map II.

On Horsepen Creek, 3.2 miles northwest of Horsepen; **Cedar Grove Coal**; elevation, 1470′ B.

			Feet	Inches
Shale, sandy			8	0
Coal, soft, poor grade	1′	3″		
Coal, gas	3	1		
Shale, gray	0	1		
Coal, gas	0	8		
Coal, bony	0	6		
Slate, black	0	1		
Coal, hard	1	3		
Coal, splinty	1	3	8	2
Slate				

Coal Prospect—No. 556 on Map II.

On Horsepen Creek, 1 mile northeast of Domestic; **Cedar Grove Coal**; elevation, 1465′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale			5	0
Coal, gas	2′	0″		
Coal, gas, harder	1	6		
Coal, splinty	1	6	5	0
Slate				

Coal Prospect—No. 557 on Map II.

On Horsepen Creek, 1.6 miles north of Domestic; **Cedar Grove Coal**; elevation, 1425′ B.

			Feet	Inches
Earth and concealed				
Coal, gas	2′	0″		
Coal, gas, harder	2	6		
Bone	0	1		
Coal, splinty	1	0		
Bone coal and slate	0	8	6	3
Shale				

Coal Opening—No. 558 on Map II.

On Horsepen Creek, 2 miles north of Domestic; **Cedar Grove Coal**; elevation, 1410′ B.

			Feet	Inches
Shale, gray, sandy			10	0
Coal, gas	2′	10″		
Coal, hard, bony	0	3		
Coal, gas, hard	1	3		
Coal, splinty	1	6	5	10
Slate				

The following opening was examined by Hennen:

Coal Opening—No. 559 on Map II.

On Horsepen Creek, 2.7 miles northwest of Domestic; **Cedar Grove Coal**; elevation, 1400′ B.

			Feet	Inches
Shale, gray			2	0
Coal, gas	1′	0″		
Coal, splinty	3	10	4	10
Slate				

Quantity of Cedar Grove Coal Available.

Based on the evidence of the preceding pages and with a planimetric determination of the area from its outcrop on Map II by Gawthrop, the following estimate is made of the probable amount of Cedar Grove Coal. The amount already mined is only a small part of the total and is disregarded in this estimate:

Probable Amount of Cedar Grove Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	2	54.06	34,598	3,014,177,760	120,567,110
Logan	4	218.25	139,680	24,337,843,200	973,513,728
Triadelphia	4	83.00	53,120	9,255,628,800	370,225,152
Totals	.....	355.31	227,398	36,607,649,760	1,464,305,990
Mingo:					
Harvey	.....	......	....	....	....
Warfield	.....	......	....	....	....
Hardee	1	74.78	47,859	2,084,738,040	83,389,522
Lee	3	64.80	41,472	5,419,560,960	216,782,438
Williamson	3	1.75	1,120	146,361,600	5,854,464
Magnolia	4	46.90	30,016	5,229,987,840	209,199,513
Stafford	5	20.15	12,896	2,808,748,800	112,349,952
Totals	.....	208.38	133,363	15,689,397,240	627,575,889
Totals for Both Counties	.....	563.69	360,761	52,297,047,000	2,091,881,879

THE LOWER CEDAR GROVE ("LOWER THACKER") COAL.

The Lower Cedar Grove Coal, which has been described briefly in Chapter VI, pages 174-5, occurs only in the southeastern districts of the two counties, where there is a rapid expansion of all the sediments of the Kanawha Series, and this bed is only a split off the main Cedar Grove Coal. Its outcrop is not shown on Map II, but its position may be followed closely from the outcrop of the Cedar Grove above it.

Chapmanville and Logan Districts, Logan County.

In Chapmanville District, the Lower Cedar Grove Coal does not occur as a separate seam, as its identity is completely merged with the Cedar Grove Coal.

In Logan District, the coal occurs as a separate seam in a

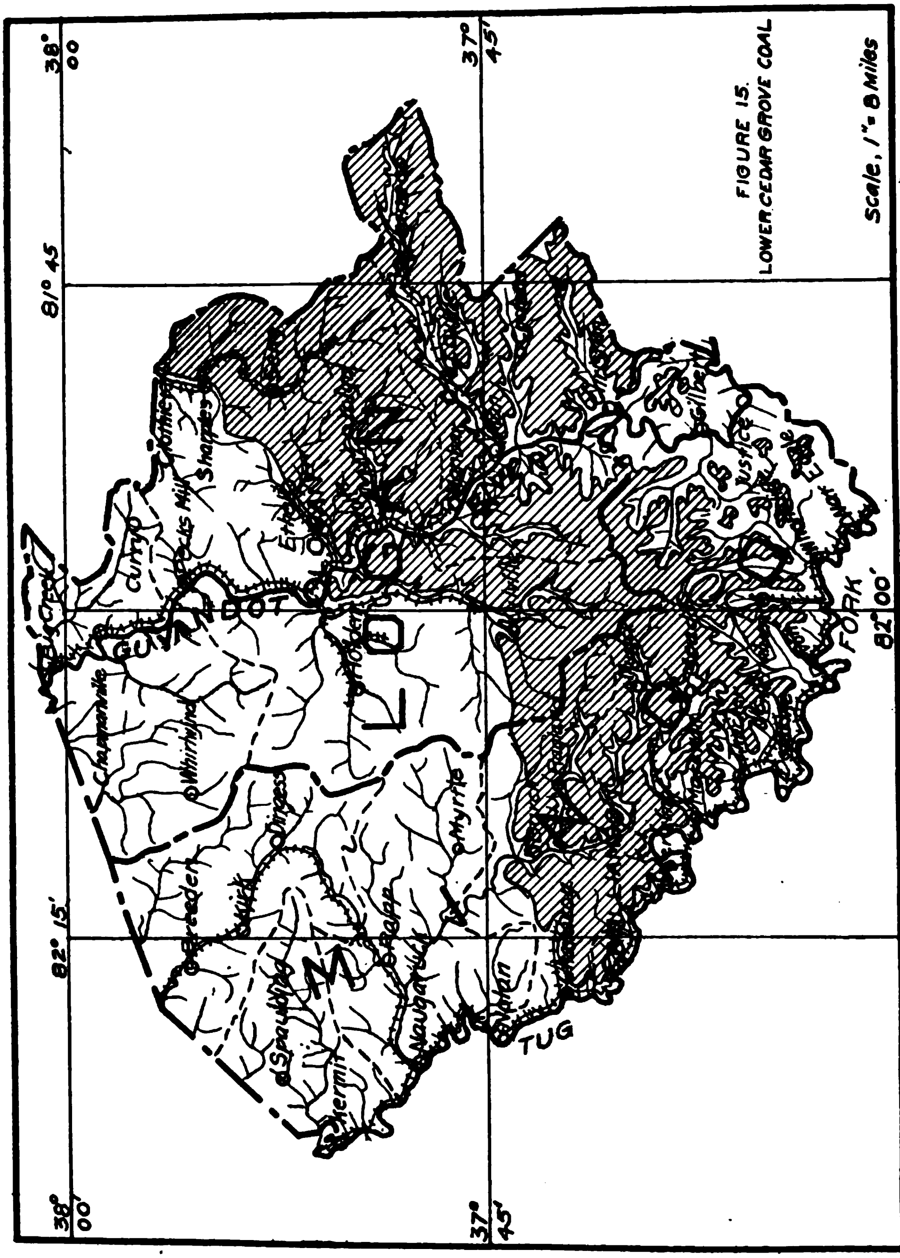

Figure 15. Showing Approximate Minable Area of Lower Cedar Grove Coal. (See explanation in Authors' Preface).

considerable part of the southeastern edge of the district, being seldom observed northwest of the Coalburg Syncline.

In Chapter IV, the Lower Cedar Grove Coal is noted in the sections for Clothier and Oilville, and in Chapter VI, it is recorded in those for Stollings and Rum Creek. In the present Chapter, it is recorded in Coal Test Borings Nos. 51, 54, 55, 64, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 88, 89, 93, 94, 96, 99 and 101.

The following opening in this coal was observed by Hennen along the Coalburg Syncline:

Coal Opening—No. 560 on Map II.

On Guyandot River at the mouth of Dingess Run, at Stollings; Lower Cedar Grove Coal; elevation, 650′ B.

	Feet.	Inches
Sandstone, massive	25	0
Coal, gas, medium hard	3	6
Fire clay and shale to Dingess Run	6	0

Another opening shows the following, according to Hennen:

Coal Opening—No. 561 on Map II.

On Guyandot River, 1.3 miles east of McConnell; Lower Cedar Grove Coal; elevation, 685′ B.

	Feet	Inches
Sandstone, massive, Middle Cedar Grove	30	0
Coal, soft	2	5
Shale		

Another opening, examined by Hennen, a short distance farther up the river, shows the following:

Coal Opening—No. 562 on Map II.

On Guyandot River, 1 mile northwest of Rolfe; Lower Cedar Grove Coal; elevation, 690′ B.

		Feet	Inches
Sandstone, massive, Middle Cedar Grove		22	0
Coal, semi-splint	1′ 8″		
Coal, gas	1 4	3	0
Shale, sandy		2	0
Sandstone, to railroad grade		5	0

Another exposure, examined by Hennen, shows the following:

Coal Exposure—No. 563 on Map II.

On Guyandot River, 0.6 mile north of Rolfe; **Lower Cedar Grove Coal**; elevation, 700′ B.

	Feet	Inches
Sandstone, massive	35	0
Coal	2	6
Sandstone, massive, to railroad grade	15	0

Another opening, examined by Hennen, farther up the river, shows the following:

Coal Opening—No. 564 on Map II.

On Guyandot River, 0.3 mile southeast of Rolfe; **Lower Cedar Grove Coal**; elevation, 770′ B.

	Feet	Inches
Sandstone, massive, grayish brown, fine grained, micaceous	15	0
Coal, good, medium hard	3	1
Fire clay, concealed, and massive sandstone to Bore Hole No. 84 on Map II		

The following opening was observed by Hennen on Island Creek:

Wood, Cole & Crane Prospect—No. 565 on Map II.

On Conley Branch of Island Creek, 3.5 miles southeast of Oilville; **Lower Cedar Grove Coal**; elevation, 1148′ L.

			Feet	Inches
Fire clay, concealed and shale from Cedar Grove Coal			11	0
Coal	0′	3″		
Shale, with coal streaks	1	4		
Coal	0	2½		
Shale, gray	0	8		
Coal	4	4	6	9½
Fire clay, shale, sandstone, and shale to Alma Coal			17	0

Another opening, examined by Hennen, shows the following:

Wood, Cole & Crane Prospect—No. 566 on Map II.

On Island Creek, 3 miles southeast of Oilville; Lower Cedar Grove Coal; elevation, 1095′ B.

			Feet	Inches
Sandstone, massive, yellowish gray, medium grained			8	0
Shale			0	10
Coal, slaty	0′	1″		
Fire clay shale	0	9		
Coal	0	0½		
Fire clay	0	4		
Coal, splinty	3	10	5	0½
Fire clay				

Triadelphia District, Logan County.

In Triadelphia District, so far as known, the Lower Cedar Grove Coal is everywhere separated from the Cedar Grove by a considerable interval. In Chapter VI, it is noted in the sections for Accoville and Buffalo Creek.

At **Opening No. 567 on Map II,** on Madison Branch of Guyandot River, 2 miles N. 75° W. of Manbar, Hennen observed the coal 24″ thick at an elevation of 880′ B.

The following opening was examined by Hennen:

Coal Prospect—No. 568 on Map II.

On Rich Creek, 4 miles southwest of Man; Lower Cedar Grove Coal; elevation, 1250′ B.

			Feet	Inches
Sandstone, massive			15	0
Coal, splinty	1′	4″		
Coal, gas	1	6	2	10
Fire clay				

At the following opening, the coal was once mined for use in firing the boilers of a lumber mill, but the mine has been temporarily abandoned. According to Hennen, the coal shows the following section:

Cole & Crane Lumber Co. Mine—No. 569 on Map II.

On Buffalo Creek, 0.7 mile east of Craneco; **Lower Cedar Grove Coal**; elevation, 1335′ B.

			Feet	Inches
Shale, flaggy and sandy			15	0
Coal, splinty	1′	11″		
Slate, gray, sandy	0	0¼		
Coal, splinty	0	9		
Shale, gray	0	2		
Coal, splinty	1	2		
Slate, gray, 0″ to	0	0½		
Coal, softer	2	6	6	6¾
Slate				

Another opening, examined by Hennen near the Logan-Mingo County Line, shows the following:

Coal Opening—No. 570 on Map II.

On Road Fork of Sandlick Branch of Guyandot River, 2.7 miles southwest of Christian; **Lower Cedar Grove Coal**; elevation, 1430′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	1′	8″		
Coal, splint	0	4		
Slate, dark	0	8		
Coal, gas	1	0		
Coal, splinty	1	0	4	8
Slate, gray				

Harvey, Warfield and Hardee Districts, Mingo County.

In **Harvey District**, the Lower Cedar Grove Coal is not above drainage, but since this district is in the region far west of the development of this coal, it is safe to assume that it is not present in the measures in minable thickness. The gas well at Dingess (No. 103 on Map II), which penetrates its horizon, shows no coal.

In **Warfield District**, the horizon of the Lower Cedar Grove Coal is above drainage along Tug Fork and Marrowbone Creek, but no coal was observed, and, furthermore, the records of numerous gas wells drilled in the district do not show it, leaving no doubt that the coal is not to be found there in minable thickness.

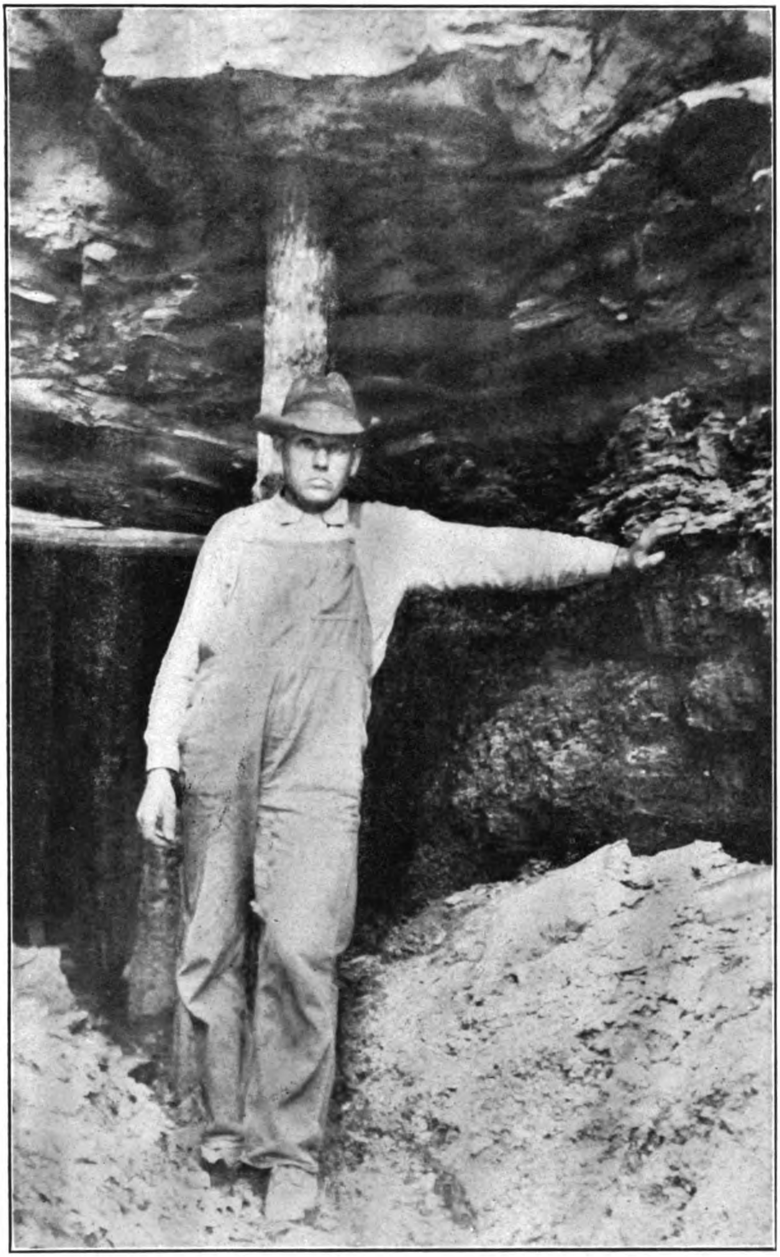

PLATE XIII.—Opening in Eagle or "Middle War Eagle" Coal—147 on Map II and in text—located on south hillside of the right fork of Stafford Branch, 1 mile southeast of Gilbert.

In **Hardee District,** the Lower Cedar Grove Coal is not above drainage, but this district, like Harvey and Warfield, is too far west to have coal of minable thickness at this horizon. The record of the Waldron Bore Hole (No. 154 on Map II), used in the section for Naugatuck, published in Chapter IV, shows only 0′ 6″ of coal at the Lower Cedar Grove horizon. The other bore holes in the district do not record it at all.

Lee District, Mingo County.

In Lee District, the Lower Cedar Grove Coal begins to develop into a minable seam. Openings were not often found, but some of these show good coal. The section for Rawl, published in Chapter IV, shows 4 feet of coal.

The three following openings were observed by Gawthrop along the waters of Pigeon Creek:

Coal Opening—No. 571 on Map II.

On Elk Creek, 1.5 miles north of Burch; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 725′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	4″		
Shale	0	3		
Coal, gas	1	6		
Shale, gray	0	7		
Coal, harder	1	6	4	2
Shale and concealed				

Coal Opening—No. 572 on Map II.

On Elk Creek, 1.8 miles N. 10° E. of Burch; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 740′ B.

			Feet	Inches
Sandstone, massive			10	0
Slate, gray			2	0
Coal, gas	0′	4″		
Shale, gray	0	1		
Coal	1	6		
Shale	0	3		
Coal, harder	1	6	3	8
Shale				

Coal Opening—No. 573 on Map II.

On Pigeon Creek, at the mouth of Lick Branch; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 795′ B.

			Feet	Inches
Shale, dark			5	0
Coal, gas	0′	8″		
Coal, hard	1	0		
Coal, bony	0	2		
Sandstone, hard	0	6		
Coal	0	10		
Slate	0	1		
Coal, hard	0	6	3	9
Concealed				

Williamson, District, Mingo County.

In Williamson District, the Lower Cedar Grove Coal is probably of minable thickness, although positive evidence is lacking. The only opening observed was **Prospect No. 574 on Map II,** on a short branch of Tug Fork at Williamson, at an elevation of 790′ B., but this had fallen shut when visited by Hennen.

Magnolia District, Mingo County.

In Magnolia District, the Lower Cedar Grove Coal assumes important proportions and is mined commercially. It is present in good thickness throughout a large part of the district.

In Chapter IV, the coal is noted in the sections for Matewan and Cedar, and in Chapter VI, it is recorded in that for Grapevine.

The following exposure was noted by Hennen in the northern part of the district:

Coal Exposure—No. 575 on Map II.

On a branch of Pigeon Creek, 1.7 miles northwest of Red Jacket; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 890′ B.

			Feet	Inches
Sandstone, massive			30	0
Coal	0′	1½″		
Slate	0	1½		
Coal, gas, hard	1	5		
Bone	0	3		
Coal	0	4	2	3
Slate and concealed				

An opening on the same branch, examined by Gawthrop, shows the following:

Coal Opening—No. 576 on Map II.

On a branch of Pigeon Creek, 2 miles northwest of Red Jacket; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 890' B.

			Feet	Inches
Shale, dark			10	0
Coal, medium hard	1'	6"		
Coal, splint	2	0		
Coal, hard	0	10	4	4
Concealed				

Along Mate Creek, the coal has been prospected and mined commercially. The following opening was examined by Hennen:

Coal Opening—No. 577 on Map II.

On Mate Creek, 2.3 miles northeast of Red Jacket; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 960' B.

			Feet	Inches
Sandstone, shaly			2	0
Coal	0'	2"		
Shale, gray	0	4		
Coal, gas	0	9		
Coal, splint	4	0		
Shale, gray	0	7		
Coal, gas	0	6		
Shale, gray	0	5		
Coal, slaty	1	6		
Shale, gray	0	6		
Coal, gas	1	0	9	9
Slate				

The following is its bed section at a commercial mine operating the coal:

Red Jacket Jr. Coal Co., Red Jacket Jr. Mine—
No. 113 on Map II.

On Mate Creek, 2 miles northeast of Red Jacket; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 978' L.

				Feet	Inches
1.	Shale, bluish gray, silicious			10	0
2.	Coal, gas, hard	0'	6"		
3.	Coal, semi-splint	0	6		
4.	Coal, gas, hard	0	7		
5.	Coal, splinty	0	6		
6.	Coal, gas	2	4	4	5
7.	Shale				

"Sample collected from Nos. 2, 3, 4, 5 and 6 of section in No. 2 Main Entry, between 3rd and 4th Right Headings, by R. M. Gawthrop; see Mine No. 108 on Map II for additional data."

The composition of this sample is published under Mine No. 113 in the table at the end of this Chapter.

The two following openings were examined by Gawthrop:

Coal Opening—No. 578 on Map II.

On Marks Branch of Mate Creek, 1.4 miles west of Meador; Lower Cedar Grove Coal; elevation, 1185' B.

			Feet	Inches
Sandstone, massive				
Coal, gas	1'	9"		
Coal, hard	0	5		
Coal, gas	2	0		
Coal, harder	1	0		
Slate	0	2		
Coal, gas	0	7	5	11
Shale				

Coal Opening—No. 579 on Map II.

On Horse Road Branch of Mate Creek, 0.9 mile northwest of Meador; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1215' B.

			Feet	Inches
Sandstone, massive				
Coal, gas	1'	5"		
Coal, splinty	2	6		
Coal, gas	0	10	4	9

The following opening was examined and sampled by Hennen:

Coal Opening—No. 114 on Map II.

On Straight Fork of Mate Creek, 0.5 mile northwest of Meador; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1215' B.

				Feet	Inches
1.	Sandstone, massive			5	0
2.	Coal, semi-splint	3'	0"		
3.	Coal, gas	1	4		
4.	Coal, splinty	0	8	5	0
5.	Slate				

A sample was collected from Nos. 2, 3 and 4 of section, the composition of which is published under Mine No. 114 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

The following opening was examined by Gawthrop:

Coal Opening—No. 580 on Map II.

On Mate Creek, 0.3 mile northeast of Meador; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1245' B.

			Feet	Inches
Sandstone, massive			6	0
Coal, gas	1'	4"		
Coal, splinty	1	4		
Coal, gas	0	7		
Coal, splinty	1	4	4	7
Shale				

The following opening was examined by Hennen on the opposite side of the creek:

Coal Opening—No. 581 on Map II.

On Mate Creek, 0.4 mile east of Meador; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1230' B.

			Feet	Inches
Sandstone, massive			5	0
Shale, gray, sandy			0	10
Coal, splinty	0'	1"		
Slate, black	0	0½		
Coal, splint	0	11		
Coal, gas	0	5		
Coal, splint	2	0		
Coal, gas	0	6		
Coal, splint	1	1		
Slate, black	0	1		
Coal, splint	0	2½	5	4
Slate				

On Beech Creek, along the eastern end of Magnolia District, several openings have been made. The following was examined by Gawthrop:

Coal Opening—No. 582 on Map II.

On Lick Branch of Beech Creek, 1.5 miles southwest of Hinch; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1480' B.

			Feet	Inches
Shale				
Coal, gas	0'	6"		
Slate, black	0	1		
Coal, gas	2	0		
Coal, splinty	1	6	4	1
Slate				

Another opening, examined by Gawthrop, shows the following:

Coal Opening—No. 115 on Map II.

On Oldhouse Branch of Beech Creek, 0.9 mile southeast of Hinch; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1465′ B.

				Feet	Inches
1.	Sandstone, shaly			5	0
2.	Coal, gas	1′	9″		
3.	Coal, gas, harder	2	0		
4.	Coal, splinty	1	3	5	0
5.	Slate				

A sample was collected from Nos. 2, 3 and 4 of section, the composition of which is published under Mine No. 115 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

Another opening, examined by Gawthrop, shows the following:

Coal Opening—No. 583 on Map II.

On Beech Creek, 0.5 mile southwest of Hinch; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1380′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas, hard	0′	10″		
Coal, splinty	1	3		
Coal, gas, hard	0	9		
Shale	0	3		
Coal, gas	0	9	3	10
Slate				

The following opening was examined by Hennen:

Coal Opening—No. 584 on Map II.

On Beech Creek, 0.3 mile northwest of Hinch; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1365′ B.

			Feet	Inches
Sandstone, massive			2	0
Coal, splinty	2′	7″		
Coal, gas	1	4	3	11
Slate				

Stafford District, Mingo County.

In Stafford District, the Lower Cedar Grove Coal is well developed and is being mined commercially.

In the eastern part of the district, the rise of the rocks causes this coal to be found only in the hill tops, but in the western part there is a considerable acreage.

The coal is mined along Alum Creek, where the three following commercial mines are located:

Glen Alum Coal & Coke Co., Mine No. 2 of No. 1 Plant—No. 116 on Map II.

On Alum Creek, 1.2 miles N. 10° W. of Glenalum; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1465′ B.

				Feet	Inches
1.	Shale				
2.	Coal, gas, soft	0′	6½″		
3.	Bone, 0″ to	0	0½		
4.	Coal, gas, hard	1	5		
5.	Coal, semi-splint	0	5		
6.	Coal, gas	0	3		
7.	Slate, 0″ to	0	0¼		
8.	Coal, gas, hard	1	9		
9.	Coal, semi-splint	0	11		
10.	Slate, 2″ to	0	0½		
11.	Coal, gas	0	8½	6	1¼
12.	Shale				

"Coal owned by Brier Mountain Coal & Coke Co.; principal office, Glen Alum; daily capacity, 2,000 tons; daily output 1,200 tons; 100 laborers and 220 miners employed; electric and mule haulage; used for steam and domestic fuel; 10 per cent. shipped east; 90 per cent. shipped west; no regular butts or faces; coal is blocky; greatest rise, S. 50° E.; sample collected from Nos. 2, 4, 5, 6, 8, 9 and 11 of section, in Room No. 26 off Davis Entry, by R. M. Gawthrop; W. A. Fink, Bookkeeper, authority for data. Data given are for Mines Nos. 1, 2 and 3, which form No. 1 Plant."

The composition of the sample is published under Mine No. 116 in the table at the end of this Chapter.

The **Glen Alum Coal & Coke Co. Mine No. 1 of No. 1 Plant (No. 117 on Map II)**, in the Lower Cedar Grove Coal, located on Alum Creek, 0.7 mile north of Glenalum, at an elevation of 1515′ B., was sampled by S. D. Brady and the results published in Volume II, page 548, of the State Survey Reports, the coal being erroneously classified there as **"Thacker"**. The analysis of this coal is published under Mine No. 117 in the table at the end of this Chapter.

Glen Alum Coal & Coke Co., Mine No. 4 of Plant No. 2—No. 118 on Map II.

On Alum Creek, 0.6 mile west of Glenalum; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1540′ B.

				Feet	Inches
1.	Sandstone, massive			10	0
2.	Shale, gray			4	0
3.	Coal, gas	1′	1″		
4.	Slate, ⅛″ to	0	0¼		
5.	Coal, gas	1	5¼		
6.	Coal, semi-splint	0	5		
7.	Coal, gas, hard	1	4		
8.	Bone	0	0½		
9	Coal, gas, hard	0	8		
10.	Coal, semi-splint	0	11		
11.	Coal, gas	0	5	6	4
12.	Shale				

"Coal owned by Brier Mountain Coal & Coke Co.; principal office, Glenalum; plant designed for a daily capacity of 1,250 tons, but is not yet in full operation; daily output, 75 tons; 30 laborers and 10 miners employed; electric haulage; used for steam and domestic purposes; shipped east and west; no regular butts or faces; coal is blocky; greatest rise, S. 50° E.; sample collected from Nos. 3, 5, 6, 7, 9, 10 and 11 of section, in Main Right Air Course, 400 feet from mouth of opening, by R. M. Gawthrop; W. A. Fink, Bookkeeper, authority for data."

The composition of this sample is published under Mine No. 118 in the table at the end of this Chapter.

An opening in the same region, examined by Gawthrop, shows the following:

Coal Opening—No. 585 on Map II.

On Hickory Fork of Left Fork of Bens Creek, 0.5 mile east of Glenalum; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1550′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas, soft	1′	0″		
Coal, gas, harder	2	0		
Coal, splinty	2	6	5	6
Slate				

The two following openings, examined by Hennen, show the coal along another fork:

Coal Opening—No. 586 on Map II.

On Lefthand Fork of Left Fork of Bens Creek, 1.4 miles southwest of Domestic; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1410′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, splint	0′	6″		
Coal, gas	1	0		
Coal, splinty	1	6		
Coal, gas	1	0	4	0
Concealed				

Coal Opening—No. 587 on Map II.

On Lefthand Fork of Left Fork of Bens Creek, 1.2 miles southwest of Domestic; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1405′ B.

			Feet	Inches
Sandstone, shaly			1	0
Coal, splint	0′	11″		
Coal, semi-splint	0	4		
Coal, splint	1	1		
Coal, gas, hard	1	10	4	2
Slate				

The two following openings were examined by Gawthrop on the head of the same creek:

Coal Opening—No. 588 on Map II.

On Left Fork of Bens Creek, 0.6 mile northwest of Domestic; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1415′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	6″		
Shale, gray	1	0		
Coal	0	6		
Slate, gray	0	8		
Coal, visible	2	0	4	8
Concealed				

Coal Opening—No. 589 on Map II.

On Left Fork of Bens Creek, 0.8 mile northwest of Bens Creek; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1420′ B.

			Feet	Inches
Sandstone, massive			8	0
Coal, gas	0′	4″		
Shale	0	5		
Coal, slaty	0	3		

			Feet.	Inches.
Coal, gas	0'	7"		
Shale	0	9		
Coal	1	6	3	10
Concealed				

Opening No. 590 on Map II, on Righthand Fork of Bens Creek, 2.5 miles northeast of War Eagle, at an elevation of 1885′ B., examined by Hennen and Gawthrop, and used in the section for War Eagle in Chapter IV, shows 5 feet of coal.

Opening No. 591 on Map II, on Bens Creek, at Twisted Gun Gap, at an elevation of 1630′ B., had fallen shut when visited by Gawthrop, but was reported to have 5 feet of coal.

The following opening was examined by Gawthrop:

Coal Opening—No. 592 on Map II.

On Bens Creek, 1.2 miles southeast of Domestic; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1465′ B.

			Feet	Inches
Shale				
Coal, gas	3'	4"		
Slate, black	0	1		
Coal, hard	2	0	5	5
Slate				

On the Guyandot River in the northeastern part of Stafford District, the Lower Cedar Grove Coal has been frequently prospected and found to be good. The following is an opening examined by Gawthrop:

Coal Opening—No. 593 on Map II.

On Henry Branch of Browning Fork of Horsepen Creek, 2.3 miles northwest of Horsepen; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1440′ B.

			Feet	Inches
Sandstone, massive			8	0
Coal, gas, soft	1'	2"		
Shale	0	7		
Coal, gas	0	3		
Shale, gray	0	1		
Coal, semi-splint	1	0		
Coal, gas, hard	1	10	4	11
Slate				

Another exposure, examined by Gawthrop, along a branch, shows the following:

Coal Exposure—No. 594 on Map II.

On Right Fork of Browning Fork of Horsepen Creek, 4 miles northwest of Horsepen; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1360′ B.

				Feet	Inches
Shale, gray, silicious					
Coal, hard, upper split				2	3
Shale, dark and concealed				20	0
Coal, cannel	0′	2″	Lower Split...	1	4
Coal	0	6			
Slate	0	1			
Coal	0	7			

The following opening was examined by Hennen and shows the same split condition:

Coal Opening—No. 595 on Map II.

On Browning Fork of Horsepen Creek, 4.3 miles northwest of Horsepen; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1335′ L.

				Feet	Inches
Shale, dark				6	0
Coal	0′	3½″	Upper Split....	3	6½
Shale, gray	0	9			
Coal, gas	2	6			
Slate and sandstone, shaly				17	0
Coal, gas, lower split				2	10
Slate					

The following opening was examined by Gawthrop:

Coal Opening—No. 596 on Map II.

On a branch of Horsepen Creek, 3.2 miles northwest of Horsepen; **Lower Cedar Grove ("Lower Thacker") Coal**; elevation, 1435′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, gray, flaggy			4	0
Coal, gas	1′	9″		
Shale, gray	0	2		
Coal	1	2	3	1
Shale				

The following exposure was noted by Hennen:

Coal Exposure—No. 597 on Map II.

On Horsepen Creek, 1.6 miles northeast of Calico; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1335′ B.

	Feet	Inches
Coal, upper split	0	6
Fire clay, sandy shale and shaly sandstone	23	0
Coal, lower split	2	4
Sandstone, flaggy, and shale, sandy, to Alma Coal	25	0

The following was examined by Gawthrop on another branch of Guyandot River:

Coal Opening—No. 598 on Map II.

On Harry Branch of Guyandot River, 1.8 miles northeast of Gilbert; Lower Cedar Grove ("Lower Thacker") Coal; elevation, 1730′ B.

			Feet	Inches
Shale, gray			10	0
Coal, gas, soft	2′	0″		
Coal, gas, harder	3	6	5	6
Slate				

At **Opening No. 599 on Map II,** on a branch of Leatherwood Creek, 2.7 miles N. 15° E. of Justice, 1820′ B., the prospect had fallen almost shut when visited by Gawthrop, only one foot of coal being visible, but it was reported 4 to 5 feet thick.

Quantity of Lower Cedar Grove ("Lower Thacker") Coal Available.

Based on the evidence of the preceding pages and on a determination of the area by interpolation between the Cedar Grove and Campbell Creek (No. 2 Gas) Coals by Gawthrop, the following estimate is made of the Lower Cedar Grove ("Lower Thacker") Coal, the amount already mined being neglected as only a small fraction of the total:

Probable Amount of Lower Cedar Grove ("Lower Thacker") Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville	....	......	......	....	....
Harvey	....	......	......	....	....
Logan	2	100.00	64,000	5,575,680,000	223,027,200
Triadelphia	3	88.00	56,320	7,359,897.600	294,395,904
Totals		188.00	120,320	12,935,577,600	517,423,104
Mingo:					
Hardee	....	......	......	....	....
Warfield	....	......	......	....	....
Hardee	....	......	......	....	....
Lee	2	66.00	42,240	3,679,948 800	147,197,952
Williamson	2.5	1.80	1,152	125,452,800	5,018,112
Magnolia	4	50.00	32,000	5,575,680,000	223,027,200
Stafford	4	25.00	16,000	2,787,840,000	111,513,600
Totals		142.80	91,392	12,168,921,600	486,756,864
Totals for Both Counties		330.80	211,712	25,104,499,200	1,004,179,968

THE ALMA COAL.

The Alma Coal, which has been briefly described in Chapter VII, pages 177-8, is of wide occurrence and of uniformly good quality. Except in the western districts of Mingo County, where the evidence indicates that it has thinned away too much for mining, it is nearly always present where its horizon occurs, being in this respect one of the most dependable coals in the two counties.

Since this coal comes at only a short interval below the **Cedar Grove** bed, it was not possible to show its outcrop on Map II without confusion. Its position, however, may be determined closely by its relation to the Cedar Grove above and the Campbell Creek (No. 2 Gas) below, its distance below the Cedar Grove being about one-third of the total interval between the Cedar Grove and the Campbell Creek. Figure 16 shows

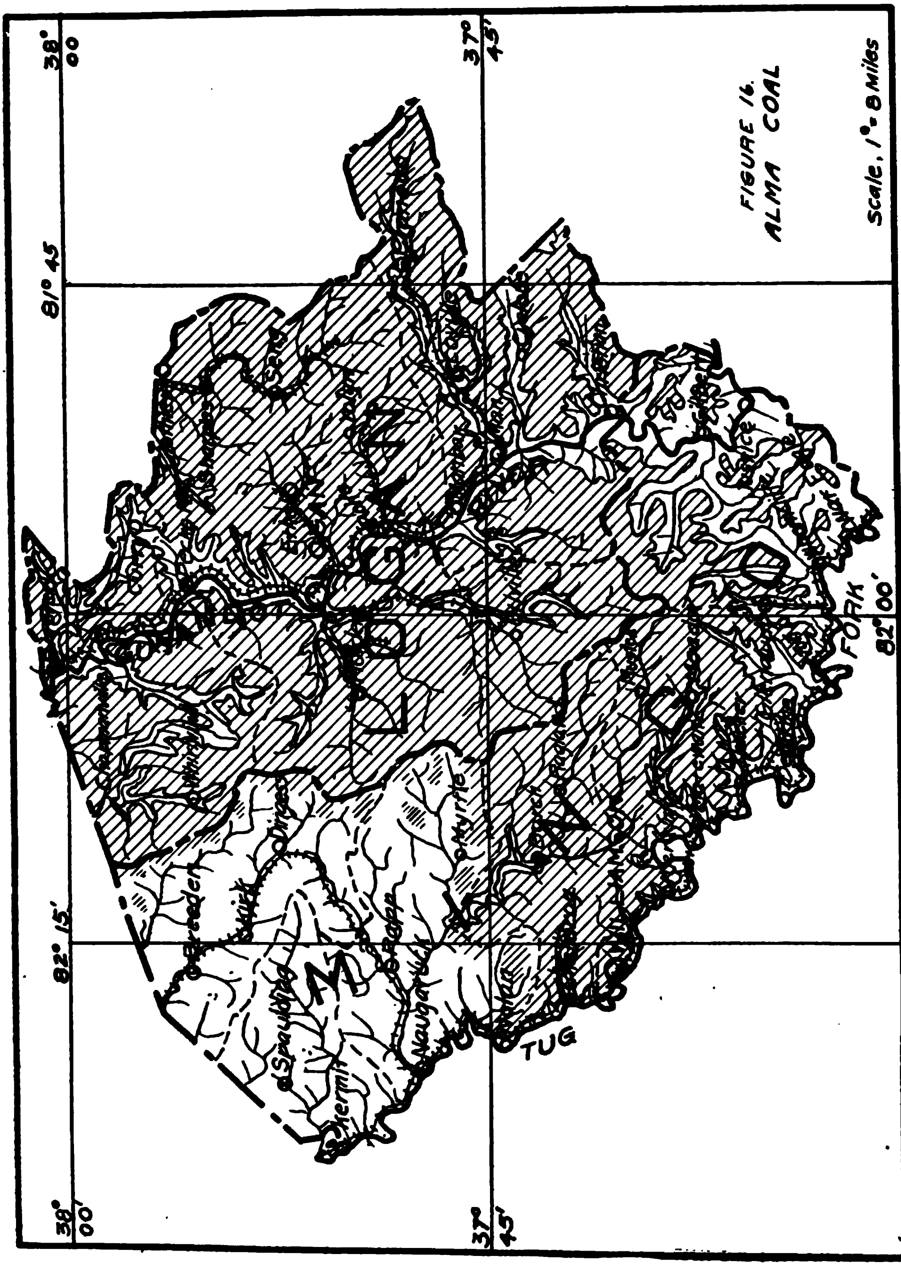

Figure 16. Showing Approximate Minable Area of Alma Coal. (See explanation in Authors' Preface).

the regions where the Alma Coal is known or believed to be of minable thickness and purity.

Chapmanville District, Logan County.

In Chapmanville District, the Alma Coal has been mined commercially along the Guyandot River and has been often prospected and used for domestic fuel on either side of the stream.

In Chapter IV, the Alma Coal is noted in the sections for Big Creek and Chapmanville, and in Chapter VI, it is recorded in those for Chapman Branch, Chapmanville Special and Whirlwind.

In the western part of the district, the Alma Coal first comes above drainage at the following opening, examined by Reger and Gawthrop:

Anthony Adams Coal Opening—No. 600 on Map II.

On Hart Creek, 2.6 miles north of Whirlwind; Alma Coal; elevation, 645′ L.

		Feet	Inches
Shale, gray			
Coal, soft	1′ 5″		
Coal, semi-splint	1 4	2	9

The two following openings were examined by Gawthrop on Hoover Fork:

Coal Opening—No. 601 on Map II.

On Hoover Fork of Hart Creek, 1.8 miles northwest of Whirlwind; Alma Coal; elevation, 720′ B.

		Feet	Inches
Sandstone, massive			
Coal, soft	1′ 0″		
Coal, harder	1 0	2	0
Concealed			

Coal Opening—No. 602 on Map II.

On Hoover Fork of Hart Creek, 1.6 miles northwest of Whirlwind; Alma Coal; elevation, 715' B.

			Feet	Inches
Sandstone, massive				
Coal, medium hard	1'	8"		
Slate	0	0¼		
Coal, splint, visible	1	0	2	8¼
Concealed				

The following opening was examined by Reger:

Coal Opening—No. 603 on Map II.

On Hoover Fork of Hart Creek, 1.8 miles N. 15° W. of Whirlwind; Alma Coal; elevation, 710' B.

	Feet	Inches
Sandstone, massive		
Coal	2	8
Shale and concealed	3	0
Sandstone, massive, to run	15	0

The following was examined by Reger on another branch:

Thos. Hensley Heirs Farm Mine—No. 604 on Map II.

On Henderson Branch of Hart Creek, 0.9 mile northwest of Whirlwind; Alma Coal; elevation, 780' B.

			Feet	Inches
Shale, dark, sandy			5	0
Coal, medium hard	1'	5"		
Coal, splint	0	11		
Coal, semi-splint	1	0	3	4
Concealed by water				

At the **Adams Farm Opening No. 605 on Map II,** 0.6 mile northeast of Whirlwind, Reger observed one foot of coal at an elevation of 860' B., but the opening had fallen partly shut, the coal being reported 2' 8" by Mr. Adams.

The following opening was examined by Gawthrop:

William Tomblin Farm Mine—No. 119 on Map II.

On Hart Creek, 1 mile southeast of Whirlwind; Alma Coal; elevation, 935' B.

			Feet	Inches
1. Shale, gray				
2. Coal, soft	0'	9"		
3. Coal, semi-splint	1	9		
4. Coal, splint	2	3	4	9

A sample was collected from Nos. 2, 3 and 4 of section, the composition of which is published under Mine No. 119 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus, and its freedom from slate makes it a valuable seam of coal in this vicinity.

At the **Joseph Blair Farm Mine (No. 606 on Map II)**, on Hart Creek, 1.8 miles southwest of Whirlwind, Gawthrop observed 2′ 3″ of coal, at an elevation of 1025′ B., but the opening had partly fallen shut, being reported 3 feet thick.

At the **Fred Riddle Farm Mine (No. 607 on Map II)**, on Hart Creek, 2.3 miles southeast of Whirlwind, Reger observed 2′ 3″ of clean coal, at an elevation of 1050′ B.

At **Exposure No. 608 on Map II**, on Buck Fork of Hart Creek, 2.5 miles northeast of Whirlwind, Reger observed 2′ 6″ of clean coal at an elevation of 730′ B.

Another opening, examined by Reger, shows the following:

Troy Vance Farm Mine—No. 609 on Map II.

On Buck Fork of Hart Creek, 2.4 miles northeast of Whirlwind; **Alma Coal**; elevation, 785′ B.

		Feet	Inches
Shale, sandy			
Coal, slaty	1′ 0″		
Coal, medium hard	2 4	3	4
Fire clay and concealed		5	0
Sandstone, massive, Logan			

The following opening was examined by Reger:

George Bryant Farm Mine—No. 120 on Map II.

On Buck Fork of Hart Creek, 1 mile east of Whirlwind; **Alma Coal**; elevation, 845′ B.

		Feet	Inches
1. Shale, sandy			
2. Coal, semi-splint	2′ 6″		
3. Coal, splint	2 9	5	3
4. Shale and concealed		5	0
5. Sandstone, massive, Logan			

A sample was collected from Nos. 2 and 3 of section, the composition of which is published under Mine No. 120 in the table at the end of this Chapter. The analysis shows a good quality of coal, but somewhat higher in sulphur than the coal from Opening No. 119.

The following was observed by Gawthrop:

Ed. Bryant Farm Mine—No. 610 on Map II.

On Buck Fork of Hart Creek, 1.9 miles southeast of Whirlwind; **Alma Coal**; elevation, 995′ B.

			Feet	Inches
Shale				
Coal, soft	0′	7″		
Coal, semi-splint	1	8		
Coal, splint	2	0	4	3
Shale				

On another fork, Gawthrop observed the following:

Matthew Dempsey Farm Mine—No. 611 on Map II.

On Smokehouse Fork of Hart Creek, 2.6 miles N. 10° W. of Shively; **Alma Coal**; elevation, 810′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, semi-splint	0′	9″		
Slate	0	0½		
Coal, splint	1	5	2	2½

The following opening was examined by Reger:

Wm. Hensley Farm Mine—No. 612 on Map II.

On Whiteoak Branch of Smokehouse Fork of Hart Creek, 1.2 miles southwest of Shively; **Alma Coal**; elevation, 1010′ B.

			Feet	Inches
Shale, sandy			7	0
Coal, splint	0′	5½″		
Slate, dark	0	0½		
Coal, semi-splint	2	0		
Coal, splint	1	1	3	7
Shale				

At the **Alexander Bryant Prospect (No. 613 on Map II)**, on Whiteoak Branch, 1.8 miles southwest of Shively, Reger observed 3 feet of clean coal, at an elevation of 1050′ B.

The following opening was examined by Gawthrop:

C. E. Conley Farm Mine—No. 614 on Map II.

On Smokehouse Fork of Hart Creek, 1.3 miles S. 15° W. of Shively; Alma Coal; elevation, 1070′ B.

			Feet	Inches
Shale, sandy			4	0
Coal, slaty	0′	5″		
Coal, semi-splint	1	7		
Coal, splint	1	2	3	2

On the Guyandot River, the Alma Coal has been prospected and mined extensively and found to be of good quality.

At **Opening No. 615 on Map II,** on Guyandot River, 0.7 mile northwest of Big Creek, Reger observed 3′ 7″ of clean coal, at an elevation of 675′ B., the base of the coal being concealed.

The following opening was examined by Reger:

Coal Opening—No. 616 on Map II.

On Limestone Branch of Guyandot River, 0.7 mile northwest of Big Creek; Alma Coal; elevation, 655′ B.

			Feet	Inches
Sandstone, massive				
Coal, splinty	0′	6½″		
Slate	0	0½		
Coal, gas	0	8		
Coal, splinty	2	0	3	3
Fire clay				

The following mine in the Alma Coal was examined and sampled by Hennen and the results published in Volume II(A), page 379, of the State Survey Reports, under the name of the Prudential Coal and Mining Company, the coal being classified provisionally as the "**No. 2 Gas**":

Black Hawk Colliery Co. Mine—No. 121 on Map II.

On Guyandot River, 0.3 mile northwest of Big Creek; **Alma Coal**; elevation, 665′ B.

				Feet	Inches
1.	Slate, good roof				
2.	Coal, semi-splint	0′	4″		
3.	Coal, splint	1	8		
4.	Coal, splint, hard	1	8		
5.	Coal, gas	0	4		
6.	Slate, bluish, 0″ to	0	3		
7.	Coal, splint, 6″ to	0	4		
8.	Fire clay shale	1	6		
9.	Coal, gas, slaty	0	11	7	0
10.	Slate and concealed to railroad level			50	0

"Principal office, Cleveland, Ohio; butts, S. 20° E.; faces, N. 70° E.; greatest rise, S. 40° E.; mine capacity, 100 tons; men employed, 8; coal shipped for steam and domestic purposes; sample from Nos. 2, 3, 4, 5 and 7 for analysis."

The composition of the sample is published under Mine No. 121 in the table at the end of this Chapter.

The following opening was examined by Reger:

Coal Opening—No. 617 on Map II.

On Big Creek, 1.3 miles northeast of Big Creek Station; **Alma Coal**; elevation, 720′ B.

			Feet	Inches
Sandstone, massive				
Slate, dark			1	0
Coal, gas	1′	0″		
Coal, semi-splint	1	2		
Shale, gray	1	6	3	8
Coal, thickness concealed by water				

The following opening was examined by Gawthrop:

Ed. Stone Farm Mine—No. 618 on Map II.

On Ed. Stone Branch of Big Creek, 2.2 miles northeast of Big Creek Station; **Alma Coal**; elevation 735′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	0′	8½″		
Slate	0	1½		
Coal, gas	0	7		
Coal, semi-splint	1	1		
Coal, splint	1	8	4	2

The following was examined by Hennen:

Coal Opening—No. 619 on Map II.

On Big Creek, 0.6 mile northwest of Banco; **Alma Coal**; elevation, 755′ B.

			Feet	Inches
Shale			10	0
Coal, gas	0′	9″		
Coal, splint	1	0		
Slate, black, coaly	0	11		
Coal, splint	0	6		
Coal, gas	0	2		
Coal, splint	2	5	5	9
Fire clay				

The following opening was examined by Gawthrop:

James Duty Farm Mine—No. 620 on Map II.

On North Fork of Big Creek, 0.7 mile northeast of Banco; **Alma Coal**; elevation, 795′ B.

			Feet	Inches
Shale, sandy, gray				
Coal, gas	0′	7″		
Slate, black	0	1		
Coal, gas	0	6		
Shale	0	2½		
Coal, semi-splint	1	0		
Coal, splint	2	1	4	5½

Another opening, examined by Hennen, Krebs and Reger, shows the following:

F. D. Thomas Farm Mine—No. 621 on Map II.

On North Fork of Big Creek, 1.4 miles northeast of Banco; **Alma Coal**; elevation, 810′ B.

			Feet	Inches
Shale, sandy, brown			9	0
Coal, splint	0′	7¾″		
Slate, black	0	0¼		
Coal, gas, hard	1	1		
Coal, splint	1	0		
Slate, gray	0	5		
Coal, splint	1	0	4	2
Slate, gray and hard, pavement				

Opening No. 622 on Map II, on Chapman Branch of North Fork of Big Creek, 2.6 miles northeast of Big Creek Station, as examined by Hennen and published in the section for Chapman Branch in Chapter VI, shows 2′ 10″ of coal, at an elevation of 860′ B.

Opening No. 623 on Map II, on Trace Fork of Big Creek, 0.9 mile northwest of Manila, at an elevation of 895′ B., had fallen shut when visited by Gawthrop, but was reported 6 feet thick with a shale parting 15″ from the bottom.

The following opening was examined by Gawthrop:

Elbert Ferrell Farm Mine—No. 624 on Map II.

On Trace Fork of Big Creek, 0.8 mile west of Manila; Alma Coal; elevation, 930′ B.

			Feet	Inches
Shale, gray, sandy				
Coal, gas	0′	9″		
Slate, black	0	1		
Coal, gas	2	6		
Coal, splint	1	3		
Shale, gray	0	5		
Coal, splint	1	0	6	0
Fire clay				

The following opening was examined by Gawthrop:

J. B. Wheatley Farm Mine—No. 625 on Map II.

On Kanawha Branch of Big Creek, 1.6 miles southwest of Manila; Alma Coal; elevation, 1040′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	7″		
Coal, harder	0	8		
Coal, semi-splint	1	0		
Coal, splint	1	6		
Shale, gray	0	7		
Coal, splint	0	8	5	0
Slate				

The following opening was examined by Gawthrop:

Peter Dingess Farm Mine—No. 626 on Map II.

On Big Creek, 1.2 miles southwest of Manila; **Alma Coal**; elevation, 1020′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	0′	6″		
Coal, slaty	0	8		
Coal, semi-splint	1	4		
Coal, splint	1	10		
Shale, gray	0	6		
Coal, splint	0	8	5	6
Slate				

The following opening was examined by Gawthrop:

J. E. Haner Farm Mine—No. 627 on Map II.

On a short branch of Big Creek, 1.1 miles northwest of Curry; **Alma Coal**; elevation, 1165′ B.

			Feet	Inches
Shale, gray				
Coal, gas	0′	10″		
Slate, black	0	1		
Coal, hard	0	3		
Coal, gas	0	5		
Coal, splint	1	5		
Slate, reported	0	3		
Coal, reported	0	6	3	9

The following opening was examined by Reger just above the mouth of Big Creek:

Coal Prospect—No. 628 on Map II.

On Guyandot River, 0.2 mile south of Big Creek Station; **Alma Coal**; elevation, 750′ B.

			Feet	Inches
Sandstone, massive				
Coal, splint	0′	4″		
Coal, gas	0	11		
Coal, semi-splint	1	6		
Coal, splint	0	10	3	7
Fire clay, about			1	0
Sandstone, massive, Logan				

The following opening was examined by Reger:

George Lily Farm Mine—No. 629 on Map II.

On Lily Branch of Guyandot River, 1 mile northwest of Stone Branch; **Alma Coal**; elevation, 760′ B.

			Feet	Inches
Shale, sandy				
Coal, soft	1′	5″		
Coal, hard, semi-splint	1	2		
Shale, gray	0	6		
Coal	0	2	3	3
Fire clay				

The following mine in the Alma Coal was examined and sampled by Hennen and the results published in Volume II(A), page 379, of the State Survey Reports, the coal being provisionally classified as the **"No. 2 Gas"**:

Stone Branch Coal & Coke Co.—No. 122 on Map II.

On a short branch of Guyandot River, 0.5 mile northeast of Stone Branch Station; **Alma Coal**; elevation, 744′ L.

			Feet	Inches
1. Sandstone				
2. Coal, semi-splint	2′	0″		
3. Slate (not present always)	0	0¼		
4. Coal, semi-splint, hard	1	7	3	7¼
5. Slate				

"Butts, S. 30° E.; faces, N. 60° E.; greatest rise, S. 40° E.; mine capacity, 300 tons; men employed, 21; coal shipped east and west for steam and domestic purposes; authority for mine data, Asa Young, Mine Foreman; sample from Nos. 2 and 4 for analysis."

The composition of this sample is published under Mine No. 122 in the table at the end of this Chapter.

The following is another commercial mine in the same region:

Guyandot Coal Co., Kitchen Mine—No. 123 on Map II.

On Guyandot River, at Kitchen; **Alma Coal**; elevation, 810′ B.

			Feet	Inches
1. Sandstone, massive				
2. Coal, semi-splint	0′	6½″		
3. Bone	0	1½		
4. Coal, semi-splint	0	6		
5. Coal, gas	1	6		
6. Coal, semi-splint	0	6		
7. Coal, gas	1	6	4	8
8. Shale				

"Coal owned by M. D. Stone, Will Perry, et al.; principal office, Branchfield; daily capacity, 200 tons; daily output, 150 tons; 20 laborers and 30 miners employed; mule and gasoline motor haulage; used for steam and domestic fuel; shipped east and west; no butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 5 6, and 7 of section at face of Main Heading, 600 feet above 10th Right Heading, by R. M. Gawthrop; J. W. Cuthbertson, Superintendent, authority for data."

The composition of this sample is published under Mine No. 123 in the table at the end of this Chapter.

This mine in the Alma Coal was once examined and sampled by Hennen and the results published in Volume II(A), page 379, of the State Survey Reports, under the name of the Big Creek Coal Co., the coal being provisionally classified as **"No. 2 Gas."**

The following opening was examined by Gawthrop:

French Butcher Farm Mine—No. 630 on Map II.

On Guyandot River, 1.3 miles S. 15° W. of Chapmanville; **Alma Coal**; elevation, 920′ B.

			Feet	Inches
Shale, gray			8	0
Coal, slaty	0′	7″		
Shale, gray	0	1½		
Coal, semi-splint	1	8		
Coal, splint	1	7	3	11½
Concealed by water				

On the waters of Crawley Creek, the Alma Coal has been prospected extensively for local use. The following opening was examined by Gawthrop:

Lewis Butcher Farm Mine—No. 631 on Map II.

On Mill Fork of Crawley Creek, 1.2 miles east of Stollings; **Alma Coal**; elevation, 1045′ B.

			Feet	Inches
Sandstone			3	0
Coal, soft	0′	9″		
Slate, black	0	0¾″		
Coal, soft	0	4		
Coal, semi-splint	0	11		
Coal, splint	1	3	3	3¾″

The following opening was examined by Reger:

Burl Adams Farm Mine—No. 632 on Map II.

On Striker Fork of Crawley Creek, 0.2 mile northeast of Yantus; **Alma Coal**; elevation, 910′ B.

			Feet	Inches
Shale, sandy			5	0
Coal, medium hard	2′	6″		
Coal, splint	1	3	3	9

Another opening, examined by Reger on the same fork, shows the following:

Albert Cabell Farm Mine—No. 633 on Map II.

On Striker Fork of Crawley Creek, 0.9 mile northwest of Yantus; **Alma Coal**; elevation, 850′ B.

			Feet	Inches
Sandstone, shaly				
Coal, semi-splint	2′	4″		
Coal, splint	1	0	3	4
Fire clay				

The following opening was examined by Gawthrop:

T. D. E. Stollings Farm Mine—No. 634 on Map II.

On Pit Fork of Crawley Creek, 0.7 mile northwest of Stollings; **Alma Coal**; elevation, 915′ B.

			Feet	Inches
Sandstone, massive			4	0
Shale			1	6
Coal, soft	0′	6″		
Slate, black	0	1		
Coal, semi-splint	1	1		
Slate, black	0	0¼		
Coal, splint	1	7	3	3¼

The following opening was examined by Reger:

Martha S. Farley Farm Mine—No. 635 on Map II.

On Crawley Creek, 0.5 mile southwest of Stollings; **Alma Coal**; elevation, 990′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	2′	4″		
Coal, semi-splint	2	0	4	4
Fire clay				

The following opening was examined by Reger:

Lewis W. Dingess Prospect—No. 636 on Map II.

On Tims Fork of Crawley Creek, 2.4 miles south of Stollings; Alma Coal; elevation, 1175′ B.

			Feet	Inches
Fire clay, sandstone and shale, from Cedar Grove Coal			22	0
Coal, semi-splint	0′	4″		
Slate, dark	0	0½		
Coal, softer	1	6½		
Coal, splinty	1	1	3	0
Fire clay				

The following opening was examined by Reger and Gawthrop:

Ned Whitt Farm Mine—No. 637 on Map II.

On Crawley Creek, 3 miles southeast of Shively; Alma Coal; elevation, 1100′ B.

			Feet	Inches
Shale, gray				
Coal, semi-splint	2′	1″		
Coal, splint	1	3	3	4
Fire clay			1	6

The **Isaac Plumley Prospect (No. 638 on Map II)**, on another branch of Crawley Creek, 3 miles southeast of Shively, at an elevation of 1080′ B., had fallen shut when visited by Reger and Gawthrop, but was reported 3½′ thick, without partings, by John Whitt.

At **Prospect No. 639 on Map II**, on Guyandot River, 0.5 mile southeast of Chapmanville, the Alma Coal was found to be 3′ 9″ thick, as noted in the Chapmanville Special Section, in Chapter VI.

The following opening was examined by Hennen:

Thomas Fowler Farm Mine—No. 640 on Map II.

On Guyandot River, 0.6 mile southeast of Chapmanville; Alma Coal; elevation, 1015′ B.

	Feet	Inches
Sandstone, massive	5	0
Sandstone, shaly	4	0
Coal, semi-splint	4	3
Fire clay	0	6

At **Opening No. 641 on Map II,** on Toney Branch of Guyandot River, 0.5 mile northeast of Godby, Hennen observed 4′ 3″ of hard coal at an elevation of 1125′ B.

The following opening was examined by Hennen:

R. P. Peck Farm Mine—No. 642 on Map II.

On Price Branch of Guyandot River, 1.3 miles northwest of Pecks Mill; **Alma Coal**; elevation, 1135′ B.

			Feet	Inches
Sandy shale and sandstone			5	0
Coal, splinty	1′	4″		
Coal, gas	0	6		
Coal, splinty	2	4		
Shale, gray	1	0		
Coal, splinty	1	2	6	4
Fire clay				

Logan District, Logan County

In Logan District, the Alma Coal has been prospected extensively and has also been mined commercially with satisfactory results. The district contains a large amount of high grade coal in this seam.

Along the Coalburg Syncline, it is under drainage, but numerous bore holes have pierced its horizon and proved it to be good coal in nearly all of them.

In Chapter IV, the Alma Coal is noted in the sections for Clothier, Logan and Oilville, and in Chapter VI. it is recorded in those for Hughey, Peach Creek, Whitman, Stollings and Rum Creek. In the present Chapter, it is recorded in Coal Test Borings Nos. 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44. 45, 46, 47, 47A, 48, 49, 50, 51, 54, 55, 56, 64, 70, 71, 72, 73, 74, 75, 78, 86, 88, 95, 99 and 101, a few of which are located across the district line in Boone County.

The following opening was examined by Hennen near the Logan-Chapmanville District Line:

R. P. Peck Farm Mine—No. 643 on Map II.

On Guyandot River, 0.7 mile north of Pecks Mill; **Alma Coal**; elevation, 1170' B.

			Feet	Inches
Sandstone, massive			5	0
Coal, splinty	1'	2"		
Coal, gas	0	6		
Coal, splinty	2	3	3	11
Concealed by water				

The following opening was examined by Hennen along the axis of the Warfield Anticline:

Major Peck Coal Opening—No. 644 on Map II.

On Mill Creek, 0.5 mile southeast of Pecks Mill; **Alma Coal**; elevation, 1185' B.

			Feet	Inches
Shale, sandy			6	0
Coal, splinty	1'	8"		
Coal, gas, hard	0	9		
Coal, splinty	2	3	4	8
Fire clay, pavement				

Another opening, examined by Hennen along the same creek, shows the following:

Geo. White Coal Opening—No. 645 on Map II.

On Mill Creek, 1.2 miles southeast of Pecks Mill; **Alma Coal**; elevation, 1135' B.

			Feet	Inches
Shale, sandy				
Coal, splinty	1'	5"		
Coal, gas	0	5		
Coal, splinty	2	2	4	0
Shale, gray				

Another opening, examined by Hennen, shows the following:

Burley White Coal Opening—No. 646 on Map II.

On Long Fork of Mill Creek, 1.7 miles southeast of Pecks Mill; Alma Coal; elevation, 1110′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, sandy, dark			6	0
Coal, gas	0′	11″		
Coal, splint	0	7		
Coal, gas	0	6		
Coal, splint	1	8	3	8
Fire clay				

The following opening was examined by Hennen:

Albert White Coal Opening—No. 647 on Map II.

On Long Fork of Mill Creek, 1.9 miles southeast of Pecks Mill; Alma Coal; elevation, 1100′ B.

			Feet	Inches
Sandstone roof				
Coal, gas	0′	11″		
Coal, splint	0	6		
Coal, gas, hard	0	5		
Coal, splint	1	5	3	3
Slate				

The following prospect was examined by Reger and Gawthrop on another tributary of Guyandot River:

Henry Lawson Prospect—No. 648 on Map II.

On Buffalo Creek, 2.4 miles southeast of Henlawson; Alma Coal; elevation, 1000′ B.

			Feet	Inches
Shale, brown			1	0
Coal, medium hard	3′	0″		
Shale, gray, with coal streaks	1	6		
Coal, semi-splint	2	9	7	3
Fire clay				

The following is a commercial mine operating the Alma Coal:

E. R. Johnson Coal Co. Mine—No. 124 on Map II.

On Crooked Creek, at Hughey; Alma Coal; elevation, 1055′ L.

				Feet	Inches
1.	Shale			10	0
2.	Coal, gas, hard	1′	1½″		
3.	Sulphur bone, 0″ to	0	0½		
*4.	Coal, semi-splint	0	6		
5.	Coal, gas	0	9		
6.	Coal, splint	0	7		
7.	Coal, gas	1	0		
8.	Coal, bony, 6″ to	0	3		
9.	Coal, gas	0	5	4	8
10.	Shale				

"No butts or faces; mine about worked out; sample collected from Nos. 2, 4, 5, 6, 7 and 9 of section, at face of Main Air Course, 400 feet from pit mouth by R. M. Gawthrop; see Mine No. 35 on Map II for additional data."

The composition of this sample is published under Mine No. 124 in the table at the end of this Chapter.

The two following openings were examined by Hennen:

Freeman Coal Opening—No. 649 on Map II.

On Crooked Creek, 1.7 miles northeast of Hughey; Alma Coal; elevation, 1090′ B.

			Feet	Inches
Shale, sandy, buff			3	0
Shale, dark			2	0
Coal, gas, hard at top	1′	3″		
Coal, splint	0	7		
Coal, gas	0	6		
Coal, splint	1	3	3	7
Fire clay				

George Neece Opening—No. 650 on Map II.

On Crooked Creek, 2.5 miles northeast of Hughey; Alma Coal; elevation, 1100′ B.

			Feet	Inches
Shale, sandy			5	0
Coal, gas	0′	11″		
Coal, splint	0	8		
Coal, gas	0	6		
Coal, splint	1	4	3	5
Fire clay				

The following mine in the Alma Coal was examined and sampled by Hennen, and the results published in Volume

II(A), page 352, of the State Survey Reports, the coal being classified provisionally as the **"Powellton"**:

Draper Coal & Coke Co. Mine—No. 125 on Map II.

On Guyandot River, at the north end of Logan; **Alma Coal**; elevation, 904.6′ L.

				Feet	Inches
1.	Slate, gray, good roof				
2.	Coal, splint	0′	5″		
3.	Coal, semi-splint	0	11		
4.	"Mother" coal	0	3		
5.	Coal, semi-splint	1	5		
6.	Coal, gray splint	0	3		
7.	Coal, semi-splint	1	10	5	1

• "Principal office, Detroit, Mich.; butts, S. 40° E.; faces, N. 50° E.; greatest rise, N. 50° W.; mine capacity, 450 tons; men employed, 65; 'run-of-mine' and screenings shipped west for steam purposes; authority for mine data, Frank S. Lee, Superintendent; sample across entire face for analysis."

The composition of this sample is published under Mine No. 125 in the table at the end of this Chapter.

The **H. T. Wilson Mine (No. 126 on Map II)**, in the Alma Coal, on Guyandot River, at the east end of Logan, was examined and sampled by Hennen and the analysis published in Volume II(A), page 348, of the State Survey Reports, the coal being classified provisionally as **"Powellton."**

The analysis is published under Mine No. 126 in the table at the end of this Chapter. The section of the coal is not available.

At **Prospect Opening No. 651 on Map II**, on Mud Fork of Island Creek, 1.5 miles north of Holden, Reger observed 4′ 10″ of clean coal, at an elevation of 895′ B.

At the **U. S. Coal & Oil Co. Prospect—(No. 652 on Map II)**, on Upper Dempsey Branch of Mud Fork, 3 miles north of Holden, Reger observed 3 feet of clean coal, at an elevation of 1055′ B., being 25 feet under a prospect in the Cedar Grove.

The following opening was examined by Reger and Gawthrop:

John A. Curry Prospect—No. 653 on Map II.

On Mud Fork of Island Creek, 2.2 miles northwest of Holden; **Alma Coal**; elevation, 930′ B.

			Feet	Inches
Sandstone, massive				
Shale, sandy			4	0
Coal, medium hard	0′	11½″		
Slate, black	0	0½		
Coal, semi-splint	1	4		
Coal, splint	2	1	4	5

The following prospect was examined by Reger:

Shamrock Coal Co. Prospect—No. 654 on Map II.

On Copperas Mine Fork of Island Creek, 0.4 mile northeast of Cora; **Alma Coal**; elevation, 775′ B.

			Feet	Inches
Shale				
Coal, soft	0′	11″		
Coal, semi-splint	0	4		
Slate, black	0	2		
Coal, semi-splint	2	0	3	5
Fire clay				

Another prospect, examined by Reger, shows the following:

Cora Coal & Coke Prospect—No. 655 on Map II.

On Copperas Mine Fork of Island Creek, at Cora; **Alma Coal**; elevation, 740′ B.

			Feet	Inches
Shale, sandy			10	0
Coal, soft	0′	9″		
Coal, harder	0	6		
Slate, black	0	2		
Coal, semi-splint	2	2½	3	7½
Fire clay, streak				
Sandstone, massive, Logan				

The Alma Coal was once opened for commercial mining at the **U. S. Coal & Oil Co. Mine (No. 656 on Map II),** on Copperas Mine Fork, 1.2 miles northeast of Holden, and directly under Mine No. 9 **(No. 74 on Map II)** of the same Company. The coal is no longer operated and the opening had been fenced up when visited by Reger, but about 4 feet of coal was observed at an elevation of 710′ B.

The following prospect was examined by Reger:

Monitor Coal & Coke Co. Prospect— No. 657 on Map II.

On Island Creek, at Monitor; Alma Coal; elevation, 760′ B.

			Feet	Inches
Shale, sandy				
Coal, soft	1′	6″		
Coal, semi-splint	0	3		
Slate	0	1		
Coal, splint	2	2	4	0
Sandstone, massive, Logan				

The Alma Coal goes under drainage on Island Creek, just above Monitor, and at Monaville, where the Coalburg Syncline crosses the creek, is about 50 feet under water level. South of the syncline, the coal comes above drainage at the following prospect, examined by Hennen:

Wood, Cole & Crane Prospect—No. 658 on Map II.

On Island Creek, 0.7 mile south of Switzer; Alma Coal; elevation, 765′ B.

			Feet	Inches
Shale, sandy, dark, gray			10	0
Coal, 0″ to	1′	9″		
Shale, gray, 3″ to	3	0		
Coal	2	4	7	1
Shale				

An exposure, examined by Hennen in a cut along the C. & O. Ry., shows the following:

C. & O. Ry. Exposure—No. 659 on Map II.

On Island Creek, 2 miles south of Switzer; Alma Coal; elevation, 790′ B.

			Feet	Inches
Sandstone, massive, bluish				
Shale, 1′ 6″ to			3	0
Coal, very slaty	0′	3″		
Shale, gray	0	5		
Coal, slaty	0	1		
Shale, gray	1	4		
Coal, gas	1	8	3	9
Fire clay				

The following exposure was examined by Hennen along a creek:

Coal Exposure—No. 660 on Map II.

On Pine Creek, 0.2 mile above its mouth, 2.8 miles S. 15° W. of Switzer; **Alma Coal**; elevation, 815′ B.

			Feet	Inches
Sandstone, massive				
Shale, dark, sandy			8	0
Coal, gas, hard	0′	5½″		
Slate, 0″ to	0	0½		
Coal, splinty	1	1		
Slate, gray	0	1		
Coal, very slaty	0	4	2	0
Shale, to bed of creek			1	0

The following exposure along the C. &. O. Ry. cut was examined by Hennen:

C. & O. Ry. Exposure—No. 661 on Map II.

On Island Creek, 1.9 miles northeast of Oilville; **Alma Coal**; elevation, 860′ B.

			Feet	Inches
Sandstone, flaggy			5	0
Coal	0′	5″		
Shale, gray	0	2		
Coal	1	0		
Shale, gray	0	5		
Coal, slaty	0	4	2	4
Fire clay shale			1	0
Sandstone, massive, bluish gray				

The following exposure was examined by Hennen:

Coal Exposure—No. 662 on Map II.

On Conley Branch of Island Creek, 3.4 miles southeast of Oilville; **Alma Coal**; elevation, 1133′ B.

			Feet	Inches
Shale, sandy			4	0
Coal	0′	1½″		
Slate, gray	0	1½		
Coal	1	7		
Shale, gray	0	2		
Coal	0	6		
Slate, gray	0	1		
Coal	0	1½	2	8½
Fire clay with fossil plants, to bed of branch			2	0

The following opening was examined by Hennen on a branch a short distance above the old Hatfield Fort:

Coal Exposure—No. 663 on Map II.

On a short branch of Island Creek, 3 miles southeast of Oilville; **Alma Coal**; elevation, 1090′ B.

			Feet	Inches
Sandstone				
Coal	2′	10″		
Slate	0	2		
Coal	0	4	3	4
Fire clay				

The following was examined by Hennen a short distance above the residence of Anderson Hatfield:

Wood, Cole & Crane Prospect—No. 664 on Map II.

On Island Creek, 3 miles southeast of Oilville; **Alma Coal**; elevation, 1095′ B.

			Feet	Inches
Shale, sandy			1	0
Coal, gas	0′	5″		
Coal, splinty	2	0		
Slate, gray	0	1	2	6
Coal and concealed				

On the Guyandot River above Logan, the Alma Coal is under drainage along the Coalburg Syncline, but appears again near the mouth of Rum Creek. The following exposure was noted by Hennen along the C. & O. Ry.:

C. & O. Ry. Exposure—No. 665 on Map II.

At the mouth of Rum Creek, at Rolfe; **Alma Coal**; elevation, 705′ B.

	Feet	Inches
Shale	5	0
Coal, soft	2	5
Fire clay shale	1	0
Sandstone, massive, to grade	9	0

At **Exposure No. 666 on Map II**, on Guyandot River, 0.7 mile southeast of Rolfe, Hennen observed 2′ 2″ of coal at an elevation of 750′ B.

In the northeastern part of Logan District, the Alma Coal is above drainage along Hewett Creek of Coal River. The following opening was examined by Hennen:

M. E. Dolan Farm Mine—No. 667 on Map II.

On Hewett Creek, 2.1 miles northeast of Lake; **Alma Coal**; elevation, 1015′ B.

			Feet	Inches
Shale, dark			4	0
Coal, gas	0′	11″		
Coal, slaty	0	2		
Coal, gas	0	3		
Coal, splint	0	5		
Coal, gas	0	1		
Coal, splinty	1	3	3	1
Fire clay				

Another opening, examined by Hennen, shows the following:

E. R. Covey Farm Mine—No. 668 on Map II.

On Hewett Creek, 0.5 mile northeast of Lake; **Alma Coal**; elevation, 1065′ B.

			Feet	Inches
Sandstone, shaly			8	0
Coal, gas	0′	10″		
Coal, splint	0	6		
Coal, reported	2	2	3	6

The two following openings were examined by Gawthrop:

J. W. Sanders Farm Mine—No. 669 on Map II.

On Hewett Creek, 0.4 mile northwest of Lake; **Alma Coal**; elevation, 1105′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	0′	6″		
Coal, harder	0	4		
Slate, black	0	2½		
Coal, splint	1	4	2	4½
Concealed				

Coal Opening—No. 670 on Map II.

On Hewett Creek, 0.7 mile northwest of Lake; **Alma Coal**; elevation, 1125′ B.

			Feet	Inches
Shale, gray				
Coal, gas	0′	10″		
Slate, black	0	2		
Coal, semi-splint	0	4		
Coal, gas	0	7		
Coal, splint	1	0	2	11

The two following openings were examined by Hennen:

Coal Opening—No. 671 on Map II.

On Hewett Creek, 1 mile southeast of Lake; **Alma Coal**; elevation, 1085′ B.

			Feet	Inches
Sandstone, shaly			6	0
Coal, gas	0′	10″		
Coal, splint	0	7		
Coal, gas	0	5		
Coal, splint	1	8	3	6
Fire clay				

Coal Opening—No. 672 on Map II.

On Hewett Creek, 1.2 miles southeast of Lake; **Alma Coal**; elevation, 1100′ B.

			Feet	Inches
Sandstone, shaly, from Alma "A" Coal			24	0
Coal, gas	0′	10″		
Bone	0	2		
Coal, splint	0	6		
Coal, gas	0	5		
Coal, splint	1	1	3	0
Concealed				

Triadelphia District, Logan County.

In Triadelphia District, the Alma Coal has been prospected but little, although its horizon is above drainage along most of the water courses.

The following exposure was examined by Hennen on a tributary of Guyandot River:

Coal Exposure—No. 673 on Map II.

On Rich Creek, 4.7 miles southwest of Man; **Alma Coal**; elevation, 1200′ B.

			Feet	Inches
Sandstone, flaggy, and shale			20	0
Shale, dark			5	0
Coal	0′	2½″		
Shale, gray	0	8½		
Coal	0	11		
Fire clay	1	4		

			Feet.	Inches.
Coal	0′	7″		
Shale, gray	0	2		
Coal	0	2		
Fire clay	1	0		
Coal	0	1	5	2
Fire clay, with fossil plants, to bed of creek			2	0

Prospect No. 674 on Map II, on Hinchman Hollow of Buffalo Creek, 0.7 mile northwest of Accoville, at an elevation of 1040′ B., was fallen shut when visited by Gawthrop and the thickness of the coal was not determined.

The following exposure was observed by Hennen:

Coal Exposure—No. 675 on Map II.

On Buffalo Creek, 4.4 miles east of Craneco; Alma Coal; elevation, 1565′ B.

	Feet	Inches
Shale, black	3	0
Coal	1	9
Shale, sandy, to bed of creek	6	0

Harvey, Warfield and Hardee Districts, Mingo County.

In **Harvey District,** the Alma Coal is not above drainage and the only boring that has pierced its horizon is the gas well (No. 103 on Map II) at Dingess, published in the Dingess Section in Chapter IV, the record of which showed no coal at this horizon. Based on the evidence of this boring and on the character of the coal to the west and south, and on the fact that most of the coals of the Kanawha Series become thinner going westward, it is believed that the Alma horizon contains little minable coal in the district.

In **Warfield District,** the Alma Coal horizon is above drainage along Tug Fork at the Warfield Anticline, and along the western end of Marrowbone Creek. Along Tug Fork the coal is thin, streaked with slate, and worthless, as shown by the Kermit Section, published in Chapter IV. Along Marrowbone Creek, the coal was noted at **Prospect No. 676 on Map II,** 1.7 miles northeast of Kermit, where it was 2′ 4″ thick, at an elevation of 636′ B., as shown in the section for Marrowbone, published in Chapter VI.

In Chapter VII, the Alma Coal is noted in the records of gas wells Nos. 116, 117, 120, 134, 135, and 150, where it is from 3 to 5 feet thick, with no evidence as to the partings. Judging from its character where it is exposed along Tug Fork, the worth of the coal noted in these records will remain subject to doubt until core drilling has been done in this region.

In **Hardee District**, the Alma Coal horizon is entirely under drainage. The only evidence concerning it is that offered by the records of Coal Test Borings Nos. 154 and 155, the first of which being used in the section for Naugatuck published in Chapter IV, and the latter being published in the present Chapter. Since both of these borings show the Alma Coal to be too much split with shale partings to be minable, the value of the Alma Coal in this district is subject to serious doubt.

Lee District, Mingo County.

In the northern part of Lee District, the Alma Coal is principally under drainage, the few openings observed being thin and slaty. In the southern part along Tug Fork, there is a large amount of good coal at the Alma horizon.

In Chapter IV, the Alma Coal is noted in the sections for Chattaroy, Rawl, and Little Coon Knob.

An exposure in the northern end of the district was observed as follows by Gawthrop:

Coal Exposure—No. 677 on Map II.

On Pigeon Creek, 3.3 miles northwest of Burch; **Alma Coal**; elevation, 675′ B.

			Feet	Inches
Concealed and shale from Lower Cedar Grove Coal			12	0
Coal, hard	0′	9″		
Coal, splinty	0	6		
Coal, softer	1	0	2	3

Another exposure, observed by Gawthrop, shows the following:

Coal Exposure—No. 678 on Map II.

On Pigeon Creek, 1.8 miles N. 15° W. of Burch; Alma Coal; elevation, 695′ B.

			Feet	Inches
Sandstone, massive			20	0
Coal, medium, hard	0′	8″		
Coal, slaty	0	3		
Shale, with coal streaks	1	6		
Shale, with iron ore nodules	3	0		
Coal	0	2	5	7

The coal has been prospected along Tug Fork. The following opening was examined by Gawthrop:

Coal Opening—No. 679 on Map II.

On Tug Fork, 0.2 mile northwest of Borderland; Alma Coal; elevation, 660′ B.

			Feet	Inches
Shale, gray			4	0
Coal, gas	0′	6″		
Coal, harder	0	8		
Shale, gray	0	1		
Coal, hard	1	2	2	5
Concealed				

Another exposure, examined by Gawthrop, along the railroad cut, shows the following:

N. & W. Ry. Exposure—No. 680 on Map II.

On Tug Fork, at Chattaroy; Alma Coal; elevation, 670′ B.

			Feet	Inches
Sandstone, massive			30	0
Coal	1′	1″		
Fire clay	0	1		
Coal	0	9		
Shale, dark gray	5	0		
Coal, gas, 7″ to	0	8		
Shale, gray, 6″ to	1	8		
Coal, gas, 0″ to	1	3	10	6
Shale, to railroad grade			7	0

The following exposure was examined by Hennen:

Coal Exposure—No. 681 on Map II.

On Tug Fork, 0.2 mile south of Chattaroy; Alma Coal; elevation, 669′ L.

			Feet	Inches
Sandstone, massive			60	0
Coal	1′	10″		
Shale, gray	0	2		
Coal	0	10		
Shale, sandy, gray	5	0		
Coal	0	9		
Shale, gray, 2″ to	4	0		
Coal	1	3	13	10
Shale, gray				

An exposure examined by Hennen farther up Tug Fork shows the following:

Coal Exposure—No. 682 on Map II.

On Tug Fork at the mouth of Sycamore Creek, 2 miles southeast of Williamson; Alma Coal; elevation, 765′ B.

			Feet	Inches
Shale			1	0
Coal	1′	11″		
Shale, gray	1	8		
Coal	1	2		
Shale, gray	0	6		
Coal, splint	1	11	7	2
Fire clay shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 683 on Map II.

On Lick Creek, 1.7 miles northwest of Rawl; Alma Coal; elevation, 720′ B.

			Feet	Inches
Sandstone			3	0
Shale, gray, sandy			3	0
Coal, gas	1′	2″		
Coal, hard	0	10		
Shale, gray	1	10		
Coal, gas	0	9		
Shale, gray	0	1		
Coal, gas	0	6		
Coal, hard	1	8	6	10
Shale				

The following opening was examined by Hennen and Gawthrop:

Coal Opening—No. 684 on Map II.

On Tug Fork, 1 mile northeast of Rawl; Alma Coal; elevation, 750′ B.

			Feet	Inches
Shale, sandy			12	0
Coal, gas	0′	0½″		
Slate, gray	0	2		
Coal, gas	1	0		
Slate, dark gray	0	1		
Coal, gas	0	10		
Slate, gray	1	3		
Coal, gas	0	10		
Slate, gray	0	1½		
Coal	2	0		
Coal, reported	1	5	7	9

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 404, of the State Survey Reports, under the name of the Merrimac Coal Co.:

White Star Mining Co., Merrimac Mine—No. 128 on Map II.

On Tug Fork, at Merrimac; Alma Coal; elevation, 825′ B.

				Feet	Inches
1.	Slate, not very good roof				
2.	Draw slate			0	1
3.	Coal, gas, hard	1′	3″		
4.	Coal, gray splint, hard	0	2		
5.	Coal, gas	0	3		
6.	Coal, gray splint	0	2		
7.	Coal, semi-splint	1	8	3	6
8.	Slate				

"Greatest rise, S. 42° E.; mine capacity, 150 tons; men employed, 30; coal shipped mostly west for steam purposes; sample from Nos. 3, 4, 5, 6 and 7 for analysis."

The composition of this sample is published under Mine No. 128 in the table at the end of this Chapter.

The **Mingo Mining Co. (No. 127 on Map II)**, on Tug Fork, 0.7 mile northeast of Sprigg, once operated the Alma Coal, but the mine has been abandoned. This mine was sampled by A. P. Brady and the results published in Volume II(A), page 404, of the State Survey Reports, the thickness of the coal being reported 3′ 5″, at an elevation of 855′ B

This analysis is published under Mine No. 127 in the table at the end of this Chapter, and a measurement at the mine, made by Hennen in 1914, is published in the section for Sprigg, in Chapter IV.

Williamson District, Mingo County.

In Williamson District, the Alma Coal has been prospected and found to be thin or slaty, and has not been mined commercially. In Chapter IV, it is reported in the section for Williamson, where the coal is split into two benches 15 feet apart, the upper one of which contains 3 feet of clean coal.

At **Exposure No. 685 on Map II,** on Tug Fork, at the west portal of the tunnel, 1 mile west of Williamson, Gawthrop observed 1 foot of coal at an elevation of 705′ B.

At **Opening No. 686 on Map II,** on a short branch of Tug Fork, 0. 6 mile west of Williamson, Gawthrop observed 1′ 3″ of coal, at an elevation of 720′ B.

The following exposure was examined by Hennen:

N. & W. Ry. Exposure—No. 687 on Map II.

On Tug Fork, 0.4 mile west of Williamson; Alma Coal; elevation, 740′ B.

			Feet	Inches
Shale				
Coal	0′	1″		
Shale, gray	0	9		
Coal, slaty	0	8		
Shale, gray, with coal streaks	1	6		
Coal, splint	0	6	3	6
Shale				

The following exposure was examined by Gawthrop:

Coal Exposure—No. 688 on Map II.

On Tug Fork, at the northwest edge of Williamson; Alma Coal; elevation, 730′ B.

			Feet	Inches
Shale, sandy			4	0
Coal	0′	10″		
Shale	1	6		
Slate, coaly	0	8		
Shale	0	6		
Slate, coaly	0	3	3	9
Shale			3	0

Magnolia District, Mingo County.

In Magnolia District, the Alma Coal has been prospected and found to be of good thickness, and has been mined commercially near Matewan. In Chapter IV, it is noted in the sections for Matewan and Cedar, and in Chapter VI, its blossom is recorded in that for Thacker.

The following opening was examined by Hennen near the Lee-Magnolia District Line:

Coal Opening—No. 689 on Map II.

On Tug Fork, 2.3 miles northwest of Matewan; **Alma Coal**; elevation, 815' B.

			Feet	Inches
Shale			5	0
Coal, splint	0'	4"		
Shale, gray	1	2		
Coal	0	1		
Shale, gray	1	2		
Coal, gas	2	2		
Slate, gray	0	1		
Coal, splinty	0	8		
Slate, gray	0	1		
Coal, splint	0	10	6	7
Slate				

The following commercial mine was once examined and sampled by Hennen and the results published in Volume II(A), page 406, of the State Survey Reports:

Marvin Coal Co. Mine—No. 129 on Map II.

On Tug Fork, 0.3 mile northwest of Matewan; **Alma Coal**; elevation, 970' B.

				Feet	Inches
1.	Sandy slate, fossil plants				
2.	Draw slate, 0" to			0	2
3.	Coal, semi-splint	2'	11"		
4.	Coal, gray splint	0	8	3	7
5.	Slate				

"Greatest rise, southeast; mine capacity, 180 tons; men employed, 29; coal shipped east and west for steam and domestic purposes; authority for mine data, G. T. Booth, Mine Foreman; sample from Nos. 3 and 4 for analysis. The roof shales of the coal are nearly always crowded with fossil plants."

The composition of the sample is published under Mine No. 129 in the table at the end of this Chapter.

The following mine was examined and sampled by Hennen and the results published in Volume II(A), page 406, of the State Survey Reports:

Mate Creek Coal Co. Mine—No. 130 on Map II.

On Sulphur Creek, 0.5 mile southeast of Matewan; Alma Coal; elevation, 1050′ B.

				Feet	Inches
1.	Coal ("Thacker") Cedar Grove			4	3
2.	Slate, sandstone, concealed and slate			135	0
3.	Coal, gas	0′	3″		
4.	Slate, 0″ to	0	1		
5.	Coal, gas	0	3		
6.	Slate, 0″ to	0	0½		
7.	Coal, semi-splint	3	4	3	11½
8.	Slate				

"Principal office, Matewan; greatest rise, southeast; mine capacity, 100 tons; men employed, 25; coal shipped east and west for steam purposes; authority for mine data, S. T. Lambert, Superintendent; sample from Nos. 3, 5 and 7 for analysis. The Cedar Grove ('Upper Thacker') Coal is also mined from the same incline."

The composition of this sample is published under Mine No. 130 in the table at the end of this Chapter.

The following opening was examined by Hennen on the opposite side of the same creek:

Coal Opening—No. 690 on Map II.

On Sulphur Creek, 0.4 mile southeast of Matewan; Alma Coal; elevation, 1015′ B.

			Feet	Inches
Shale				
Coal, gas	0′	2″		
Bony slate	0	7		
Fire clay shale	2	0		
Coal, gas	2	6		
Coal, splint	0	6	5	9
Slate, concealed, and shale, to Little Alma Coal			56	0

The following opening was examined by Hennen:

Coal Opening—No. 691 on Map II.

On Mate Creek, 1.4 miles N. 15° E. of Red Jacket; **Alma Coal**; elevation, 905′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal	0′	6″		
Slate, with streaks of coal	0	5		
Coal	0	3		
Shale, gray	1	5		
Shale, sandy	0	10		
Coal, splint	0	6		
Shale, gray	0	4		
Coal, splint	0	9		
Coal and concealed			5	0

Some prospects have been made along Mate Creek in the vicinity of Meador. At one of these, Hennen and Gawthrop obtained the following:

Coal Opening—No. 692 on Map II.

On Mate Creek, 0.2 mile northeast of Meador; **Alma Coal**; elevation, 1195′ B.

			Feet	Inches
Sandstone			5	0
Shale			0	7
Coal, gas	2′	9″		
Coal, semi-splint	0	5		
Coal, gas	0	8		
Coal, splint	0	6	4	4
Slate				

The two following openings, examined by Gawthrop, are in the same neighborhood:

Coal Opening—No. 693 on Map II.

At the mouth of Meador Fork of Mate Creek, at Meador; **Alma Coal**; elevation, 1205′ B.

			Feet	Inches
Sandstone, massive			7	0
Shale			1	6
Coal, semi-splint	2′	0″		
Coal, gas, medium hard	2	7	4	7
Shale				

Coal Opening—No. 694 on Map II.

On Mate Creek, 0.4 mile northeast of Meador; **Alma Coal**; elevation, 1190′ B.

			Feet	Inches
Sandstone, flaggy			6	0
Coal, semi-splint	2′	0″		
Coal, gas, hard	1	7	3	7
Slate				

Some openings have been made along the waters of Beech Creek, where Gawthrop examined the five following openings:

Coal Prospect—No. 695 on Map II.

On Grapevine Fork of Beech Creek, 2.7 miles southwest of Hinch; **Alma Coal**; elevation, 1310′ B.

			Feet	Inches
Coal, gas	2′	6″		
Slate	0	1		
Coal, hard	2	6	5	1
Concealed				

"Coal rotten; not a good section."

Coal Opening—No. 696 on Map II.

On Grapevine Fork of Beech Creek, 3 miles southwest of Hinch; **Alma Coal**; elevation, 1300′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	0′	6″		
Coal, slaty	0	5		
Coal, gas	0	8½		
Slate, black	0	0½		
Coal, semi-splint	0	6		
Slate, black	0	1		
Coal, gas, hard	0	8		
Bone	0	1½		
Coal, gas, hard	1	3		
Slate, black	0	1		
Coal, splinty	1	9	6	1½
Slate				

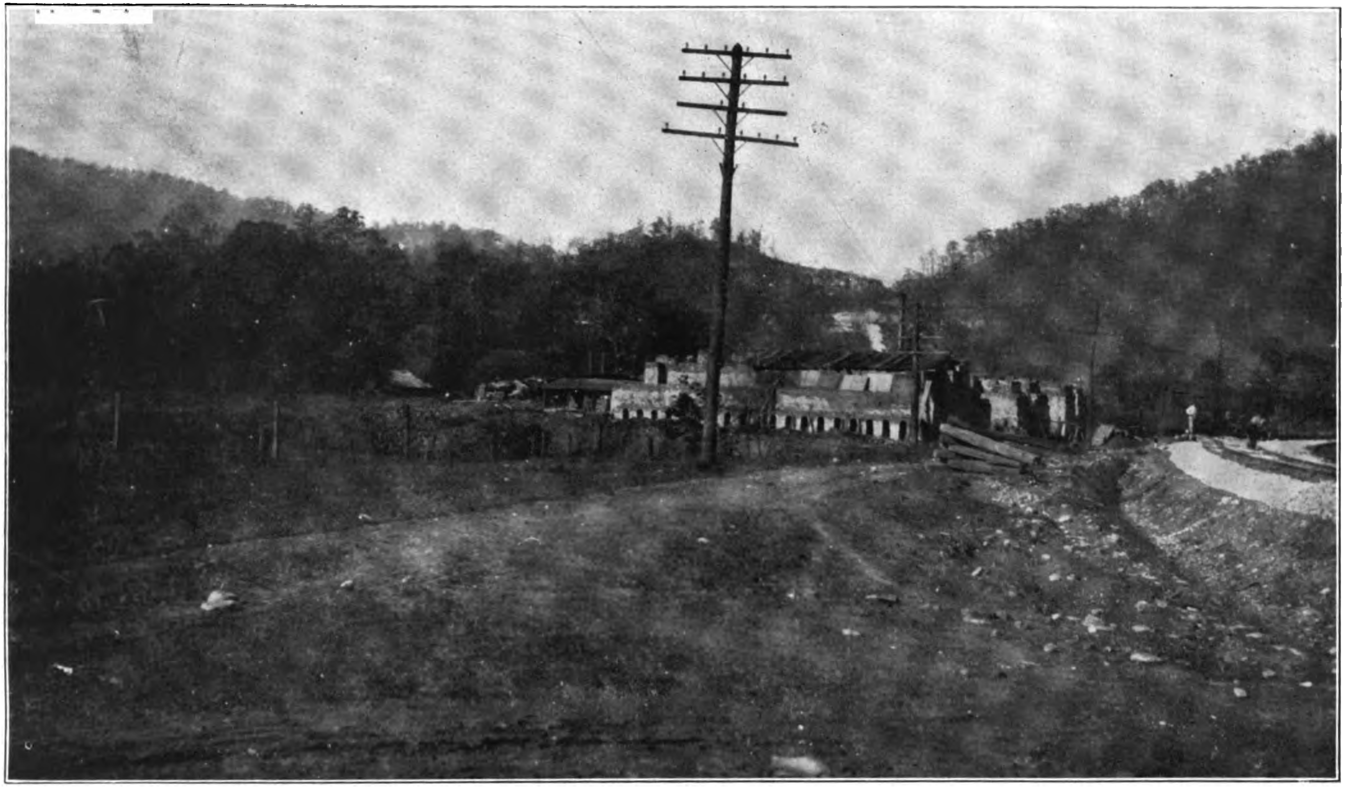

PLATE XIV.—Showing plant of Red Brick Company, 0.7 mile west of Williamson. (See Chapter IX). Alluvial deposits of Tug Fork in foreground and topography of Kanawha Series in background.

Coal Opening—No. 697 on Map II.

On Grapevine Fork of Beech Creek, 2.9 miles southwest of Hinch; **Alma Coal**; elevation, 1295′ B.

			Feet	Inches
Shale, dark gray, sandy				
Coal, gas	0′	6″		
Coal, slaty	0	3		
Coal, gas, hard	0	11		
Shale	0	1		
Coal, semi-splint	0	5		
Slate, black	0	1		
Coal, hard, splinty	1	3		
Slate, black	0	0½		
Coal, gas, hard, visible	1	0	4	6½
Concealed by water				

Coal Opening—No. 698 on Map II.

On Foundation Fork of Beech Creek, 1.5 miles southwest of Hinch; **Alma Coal**; elevation, 1280′ B.

			Feet	Inches
Shale				
Coal, gas	0′	2″		
Shale	0	2		
Coal, slaty	0	10		
Coal, gas, soft	2	0		
Slate, black	0	2		
Coal, gas, hard	3	0	6	4
Slate				

Coal Opening—No. 699 on Map II.

On Lick Branch of Beech Creek, 1.4 miles S. 15° W. of Hinch; **Alma Coal**; elevation, 1445′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	8″		
Shale	0	1		
Coal, visible	1	6		
Concealed (reported 5′ with 1′ of shale near center	5	0	7	3

Stafford District, Mingo County.

In Stafford District the Alma Coal has been prospected at some points and found to be of good thickness and quality, but has not been mined commercially.

In Chapter VI, it has been noted in the section for Browning Fork, where it is 8′ 8″ thick.

The following prospects were examined by Gawthrop:

Coal Prospect—No. 700 on Map II.

On a branch of Bens Creek, 1.2 miles southeast of Domestic; Alma Coal; elevation, 1440′ B.

			Feet	Inches
Shale				
Coal, gas	0′	3½″		
Shale	0	2½		
Coal, slaty	0	5		
Slate	0	1		
Coal, gas	1	3		
Shale	0	1		
Coal	0	1		
Shale	0	1		
Coal, gas, hard	1	10	4	4
Slate				

Coal Prospect—No. 701 on Map II.

On the head of Bens Creek, 1.2 miles S. 80° E. of Domestic; Alma Coal; elevation, 1440′ B.

			Feet	Inches
Shale			1	0
Coal, gas	0′	3½″		
Shale, gray	0	9		
Coal, slaty	0	4½		
Shale	0	1		
Coal	0	2		
Slate, black	0	1		
Coal	1	0		
Slate, black	0	1		
Coal	0	7		
Shale	0	1		
Coal	0	2		
Shale	0	3		
Coal, gas	1	8	5	7
Slate				

Some openings have been made on the waters of Guyandot River in the northeastern part of the district.

At **Exposure No. 702 on Map II,** on the head of Horsepen Creek, 1.8 miles northwest of Domestic, Hennen observed 2 feet of coal at an elevation of 1310′ B.

The following opening, which probably represents the Alma, was examined by Gawthrop:

Coal Opening—No. 703 on Map II.

On Mudlick Branch of Gilbert Creek, 2.5 miles S. 15° W. of Gilbert; **Alma Coal**; elevation, 1655′ B.

			Feet	Inches
Shale, sandy			10	0
Coal, gas	1′	9″		
Shale, gray	0	3		
Coal, gas	3	6		
Sulphur bone	0	0½		
Coal, gas	0	3½	5	10
Slate				

The following opening was examined by Gawthrop:

Coal Opening—No. 704 on Map II.

On Harry Branch of Guyandot River, 2 miles northeast of Gilbert; **Alma Coal**; elevation, 1700′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	1′	10″		
Shale, gray	0	4½		
Coal, gas	2	0	4	2½
Slate				

The following opening was examined by Gawthrop near the common corner of Logan, Mingo and Wyoming Counties:

Judge Sancel Opening—No. 131 on Map II.

On Paintlick Branch of Leatherwood Creek, 4 miles northeast of Gilbert; **Alma Coal**; elevation, 1760′ B.

				Feet	Inches
1.	Shale, gray			10	0
2.	Coal, splinty	0′	10″		
3.	Coal, gas, hard	0	10		
4.	Slate, ½″ to	0	1		
5.	Coal, splinty	0	6		
6.	Coal, gas, soft	1	9	4	0
7.	Slate				

A sample was collected from Nos. 2, 3, 5 and 6 of section, the composition of which is published under Mine No. 131 in the table at the end of this Chapter. The analysis shows a good coal, low in ash, sulphur and phosphorus.

Quantity of Alma Coal Available.

Based on the evidence of the preceding pages and with a determination of the area interpolated by Gawthrop between those of the Cedar Grove and Campbell Creek (No. 2 Gas) Coals, the following estimate is made of the probable amount of the Alma Coal:

Probable Amount of Alma Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Chapmanville........	2	58.00	37,120	3,233,894,400	129,355,776
Logan	2	225.00	144,000	12,545,280,000	501,811,200
Triadelphia...........	2	93.00	59,520	5,185,382,400	207,415,296
Totals............	.....	376.00	240,640	20,964,556,800	838,582,272
Mingo:					
Harvey	.....	.....	......	....	....
Warfield	.....	.....	......	....	....
Hardee	.....	.....	......	....	....
Lee	2	68.00	43,520	3,791,462,400	151,658,496
Williamson	2	2.45	1,568	136,604,160	5,464,166
Magnolia	3	52.00	33,280	4 349,030,400	173,961,216
Stafford	3	30.00	19,200	2,509,056,000	100,362,240
Totals............	.....	152.45	97,568	10,786,152,960	431,446,118
Totals for Both Counties	.....	528.45	338,208	31,750,709,760	1,270,028,390

THE CAMPBELL CREEK ("NO. 2 GAS") COAL.

The Campbell Creek Coal, often called "No. 2 Gas" by the operators, which has been described in Chapter VI, pages

185-190, is the most widespread in its occurrence and the most regular in its mining section of all the coals of the Kanawha Series that are found in the two counties. There is evidence to support the statement that this horizon contains minable coal in every magisterial district in the two counties, except in Harvey District, Mingo County, where it is under drainage and positive information is lacking.

The base of the Campbell Creek Coal has been used as the horizon most suited for plotting the green structure contours shown on Map II and its outcrop is shown in detail on the same map in blue. Figure 17 shows its areal extent.

Chapmanville District, Logan County.

In Chapmanville District, the Campbell Creek Coal is above drainage for several miles on either side of the Warfield Anticline. The coal in this region is not so thick as in other portions of Logan County, but is usually of good quality.

In Chapter IV, the coal is noted in the section for Big Creek, and in Chapter VI, it is recorded in those for Chapman Branch and Stone Branch.

On the headwaters of Hart Creek, the Campbell Creek Coal is above drainage and has been opened frequently for local use. In the region of Whirlwind, the coal comes above drainage a short distance below the school house, where it is mined by stripping, in the creek, about 2 feet being visible.

The following opening was examined by Reger:

Coal Opening—No. 705 on Map II.

On Hart Creek, 0.2 mile north of Whirlwind; **Campbell Creek (No. 2 Gas) Coal**; elevation, 740′ B.

			Feet	Inches
Shale, sandy			15	0
Coal, slaty	0′	6″		
Slate, black	0	1		
Coal, good	2	8	3	3
Fire clay				

An opening farther up the creek shows the following, according to Gawthrop:

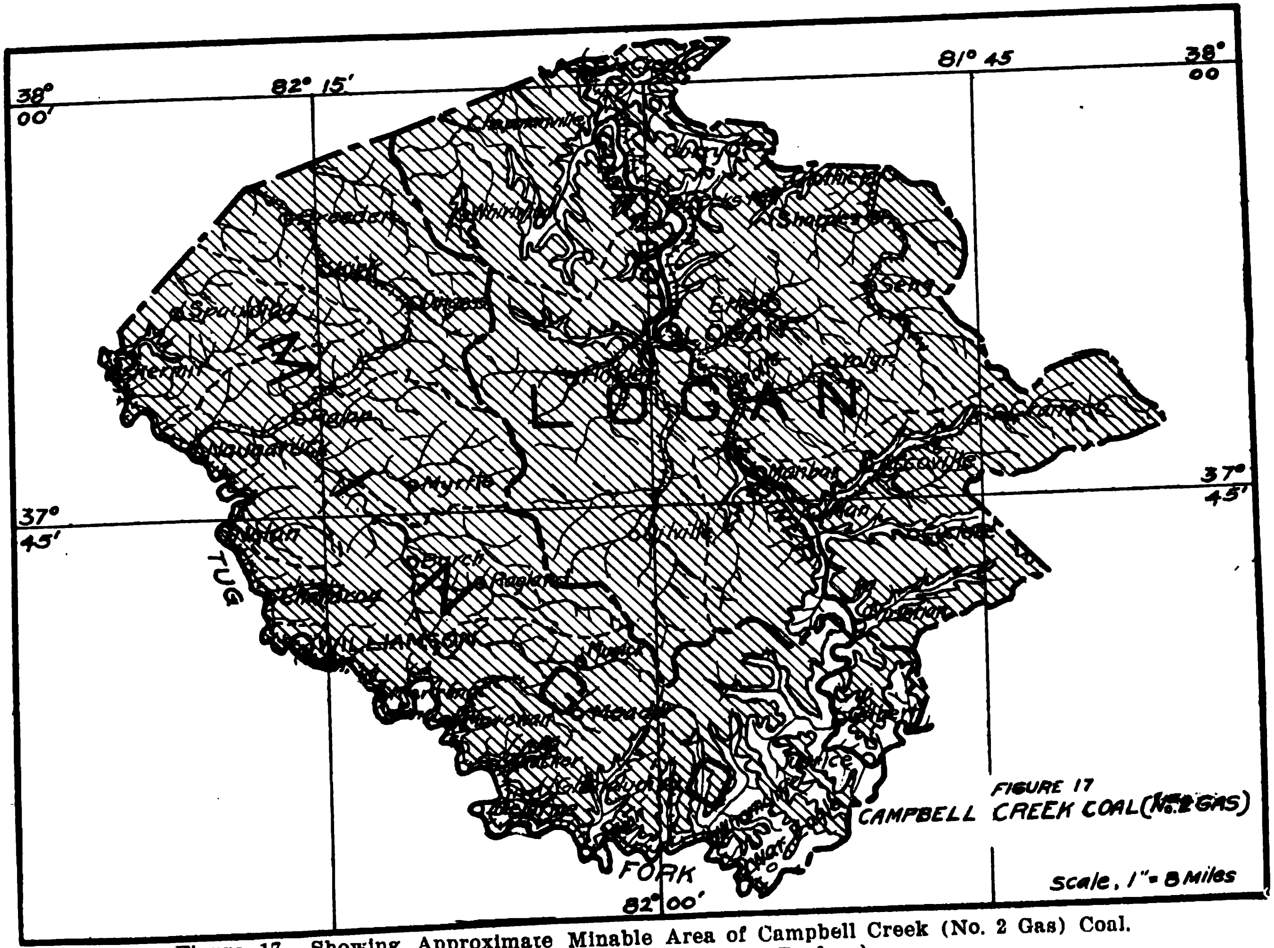

Figure 17. Showing Approximate Minable Area of Campbell Creek (No. 2 Gas) Coal. (See explanation in Authors' Preface).

Sarah Collins Heirs Farm Mine—No. 706 on Map II.

On Hart Creek, 1.4 miles southeast of Whirlwind; Campbell Creek (No. 2 Gas) Coal; elevation, 895′ B.

			Feet	Inches
Shale			5	0
Coal, slaty	0′	5″		
Coal, semi-splint	1	4		
Coal, splint	1	1	2	10
Concealed by water				

On Buck Fork, the Campbell Creek Coal is entirely under drainage, but on Smokehouse Fork, farther east, it is visible. The following opening was examined by Reger near the point where it is first brought above water by the southeastward rise:

Minerva Dempsey Farm Mine—No. 132 on Map II.

On Smokehouse Fork of Hart Creek, 1.8 miles south of Halcyon; Campbell Creek (No. 2 Gas) Coal; elevation, 715′ B.

				Feet	Inches
1.	Sandstone, massive, Logan and Malden			85	0
2.	Shale, dark, with iron ore			7	0
3.	Coal, semi-splint	2′	2″		
4.	Slate, black	0	1		
5.	Coal, semi-splint	0	7	2	10
6.	Shale, gray and sandy, to creek			5	0

A sample was collected from Nos. 3 and 5 of section, the composition of which is published under Mine No. 132 in the table at the end of this Chapter. The analysis shows a fine quality of coal, very low in ash and phosphorus and low in sulphur.

The following opening was examined by Gawthrop:

John Smith Farm Mine—No. 707 on Map II.

On Smokehouse Fork of Hart Creek, 1 mile northeast of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 855′ B.

			Feet	Inches
Shale				
Slate, black			0	7
Coal, semi-splint	1′	10″		
Shale, gray	0	3		
Coal	0	4½		
Bone	0	3½		
Coal, splint	0	8	3	5

An opening, examined by Reger and Gawthrop, shows the following:

Ed. Dingess Farm Mine—No. 707A on Map II.

On Smokehouse Fork of Hart Creek, 0.5 mile northeast of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 895′ B.

			Feet	Inches
Shale, sandy			10	0
Coal, slaty	0′	6″		
Coal, semi-splint	1	10		
Coal, slaty	0	6		
Shale, gray	0	4		
Coal, hard	0	11	4	1
Shale				

The following opening was examined by Reger:

Coal Opening—No. 708 on Map II.

On Whiteoak Branch of Smokehouse Fork of Hart Creek, 0.6 mile southwest of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 885′ B.

			Feet	Inches
Coal, slaty	0′	6″		
Coal, good	2	4	2	10
Concealed and shale			10	0
Coal, splint			0	8

A digging along the bed of the branch shows the following, according to Reger:

Wm. Dawson Opening—No. 709 on Map II.

On Whiteoak Branch of Smokehouse Fork of Hart Creek; Campbell Creek (No. 2 Gas) Coal; elevation, 895′ B.

			Feet	Inches
Shale, gray			3	0
Coal, slaty	0′	5″		
Coal, medium hard	0	8		
Slate, black	0	1		
Coal, medium hard	1	3	2	5
Shale, gray				

The following opening was examined by Reger:

Ulysses Conley Coal Prospect—No. 710 on Map II.

On Smokehouse Fork of Hart Creek, 0.8 mile south of Shively; **Campbell Creek (No. 2 Gas) Coal**; elevation, 950′ B.

			Feet	Inches
Shale, brown			10	0
Slate, black, coaly	0′	6″		
Coal, semi-splint	2	0		
Coal, splint	0	10	3	4
Shale				

At **Opening No. 711 on Map II,** on Smokehouse Fork of Hart Creek, 1.6 miles S. 5° W. of Shively, Reger observed 3 feet of coal at an elevation of 985′ L.

On the Guyandot River, the Campbell Creek Coal comes above drainage on the southeastward rise of the rocks near the mouth of Limestone Branch. An exposure examined by Hennen and Reger along the railroad shows the following:

C. & O. Ry. Exposure—No. 712 on Map II.

On Guyandot River, at the south end of Big Creek Station; **Campbell Creek (No. 2 Gas) Coal**; elevation, 650′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	0′	2″		
Slate, black, coaly	0	7		
Coal, semi-splint	1	8	2	5
Fire clay, hard, ferriferous			4	0
Sandstone, massive, to grade			5	0

The blossom of the coal is exposed along Big Creek between Big Creek Station and Banco, but it is too thin for mining and along North Fork, in Logan County, it shows the same character. Farther up main Big Creek, it becomes thicker.

The following opening was examined by Gawthrop:

Fry Lucas Opening—No. 712A on Map II.

On Big Creek, 0.4 mile southeast of Banco; **Campbell Creek (No. 2 Gas) Coal**; elevation, 750′ B.

			Feet	Inches
Shale, gray			6	0
Coal, gas	0′	3″		
Slate, coaly	0	6		
Coal, gas	0	10		
Coal, splint, visible	1	0	2	7
Concealed				

Another opening, examined by Gawthrop, shows the following:

Coal Opening—No. 712B on Map II.

On Vickers Branch of Big Creek, 0.7 mile southwest of Banco; **Campbell Creek (No. 2 Gas) Coal**; elevation, 735′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	0′	3½″		
Slate, coaly	0	4½		
Coal, gas	1	0		
Coal, splint	1	4	3	0

The following opening was examined by Gawthrop:

Coal Opening—No. 713 on Map II.

On Big Creek, 2.3 miles northwest of Curry; **Campbell Creek (No. 2 Gas) Coal**; elevation, 990′ B.

			Feet	Inches
Shale, gray, sandy			8	0
Coal, gas	0′	4″		
Slate, coaly	0	6		
Coal, gas	1	1		
Coal, harder	1	1		
Shale, gray	0	7		
Coal, splint	1	2	4	9

Another opening, examined by Gawthrop, shows the following:

P. D. Garrett Farm Mine—No. 714 on Map II.

On Big Creek, 1.8 miles northwest of Curry; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1030′ B.

			Feet	Inches
Shale, sandy				
Coal, gas	0′	3″		
Slate, with coal streaks	0	5		
Coal, gas	1	2		
Coal, semi-splint	1	3		
Slate	0	1		
Coal, splint	1	1	4	3

The following opening was examined by Gawthrop:

Coal Opening—No. 715 on Map II.

On Rocklick Branch of Big Creek, 1 mile west of Curry; Campbell Creek (No. 2 Gas) Coal; elevation, 1070' B.

			Feet	Inches
Shale, sandy				
Slate, coaly, roof			1	4
Coal, gas	0'	7"		
Coal, harder	0	11		
Coal, splint	0	9		
Slate	0	1½		
Coal, splint	1	0	3	4½
Fire clay shale				

The following opening was examined by Hennen:

Benjamin Curry Farm Mine—No. 716 on Map II.

On Curry Fork of Big Creek, 1.3 miles northeast of Curry; Campbell Creek (No. 2 Gas) Coal; elevation, 1180' B.

			Feet	Inches
Shale, sandy, bluish				
Coal, gas	0'	7"		
Slate, black	0	2		
Coal, semi-splint	0	4		
Coal, good	0	7		
Coal, splint	1	1		
Coal, gas	0	9	3	6
Fire clay				

Another opening, examined by Hennen, shows the following:

Coal Opening—No. 717 on Map II.

On a branch of Garret Fork of Big Creek, 1 mile east of Curry; Campbell Creek (No. 2 Gas) Coal; elevation, 1115' B.

			Feet	Inches
Shale			1	0
Slate, black, hard			0	1
Coal, gas, hard, blocky	1'	7"		
Coal, splinty	0	1		
Coal, gas, hard	1	0	2	8
Fire clay				

The following opening was examined by Gawthrop:

Coal Opening—No. 718 on Map II.

On Gore Fork of Big Creek, 0.9 mile S. 5° E. of Curry; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1115′ B.

			Feet	Inches
Shale, gray, sandy			8	0
Coal, gas	0′	3″		
Slate	0	2		
Coal, slaty	0	6		
Coal, semi-splint	1	2	2	1
Concealed by water				

The following opening was examined by Hennen along the Chapmanville-Logan District Line:

Milton Stowers Farm Mine—No. 719 on Map II.

On Gore Fork of Big Creek, 0.7 mile south of Curry; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1135′ B.

			Feet	Inches
Shale, sandy, bluish			6	0
Coal, gas, block	0′	3″		
Slate, black, with coal streaks	0	5		
Coal, semi-splint	3	4	4	0
Pavement				

On Crawley Creek, the Campbell Creek Coal has been prospected frequently for local use. The following opening was examined by Gawthrop:

Lewis Butcher Farm Mine—No. 720 on Map II.

On Mill Fork of Crawley Creek, 1.2 miles N. 80° E. of Stollings; **Campbell Creek (No. 2 Gas) Coal**; elevation, 935′ B.

			Feet	Inches
Sandstone			3	0
Shale, gray			0	3
Coal, soft	0′	8″		
Coal, harder, visible	1	7	2	3

An opening, examined by Gawthrop on another branch, shows the following:

Coal Opening—No. 721 on Map II.

On a short branch of Crawley Creek, 0.6 mile southeast of Stollings; Campbell Creek (No. 2 Gas) Coal; elevation, 910′ B.

			Feet	Inches
Sandstone				
Coal, soft	0′	7″		
Coal, harder	1	6		
Shale, black	0	1½		
Coal	0	1		
Shale, gray	0	1½		
Coal, splint, visible	0	8	3	1
Concealed				

The following opening was examined by Reger:

Stonewall Ferrell Prospect—No. 722 on Map II.

On Hurricane Fork of Crawley Creek, 1.5 miles southeast of Stollings; Campbell Creek (No. 2 Gas) Coal; elevation, 1000′ B.

			Feet	Inches
Shale, dark			5	0
Coal, slaty	0′	6″		
Coal, medium hard	0	8		
Coal, splint	1	5	2	7
Shale, gray				

The following opening was examined by Reger and Gawthrop:

Sarah Adams Prospect—No. 723 on Map II.

On Brushy Fork of Crawley Creek, 1.4 miles S. 15° E. of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 970′ B.

			Feet	Inches
Shale, brown, with iron ore nodules			3	0
Slate, coaly	0′	6″		
Coal, semi-splint	2	1		
Slate, gray	0	1		
Coal, splint	0	7		
Slate, gray	0	1½		
Coal	0	3	3	7½
Shale, gray			0	4
Concealed by water				

The following opening was examined by Reger along the Warfield Anticline:

Lewis W. Dingess Prospect—No. 724 on Map II.

On Tims Fork of Crawley Creek, 2.3 miles south of Stollings; Campbell Creek (No. 2 Gas) Coal; elevation, 1060′ B.

			Feet	Inches
Interval from Alma Coal			112	0
Shale, sandy			1	0
Coal	1′	3″		
Slate, dark	0	0½		
Coal	0	10½	2	2
Fire clay				

The following opening was examined by Reger and Gawthrop:

Ed. Peck Prospect—No. 725 on Map II.

On Crawley Creek, 1.8 miles southeast of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 1000′ B.

			Feet	Inches
Sandstone, massive				
Coal, slaty	0′	4″		
Coal, semi-splint	1	6		
Coal, splint	0	7½		
Shale, gray	0	10		
Coal, visible	0	3	3	6½
Concealed by water				

The following opening was examined by Reger and Gawthrop:

Isaac Plumley Prospect—No. 726 on Map II.

On Crawley Creek, 3 miles southeast of Shively; Campbell Creek (No. 2 Gas) Coal; elevation, 960′ B.

			Feet	Inches
Shale, gray				
Slate, with streaks of coal	0′	7″		
Coal, semi-splint	2	2		
Slate, gray	0	10		
Coal, splint	1	2	4	9
Fire clay				

The **George Richards Heirs Opening (No. 727 on Map II)**, on the head of Crawley Creek, 2.1 miles southeast of Shively, at an elevation of 965′ B., was fallen shut when visited by Gawthrop, but the coal was reported to be 4 feet thick with a 4″ shale parting in the lower half.

The following opening was examined by Hennen:

Coal Opening—No. 728 on Map II.

On Guyandot River, 0.4 mile northeast of Godby; Campbell Creek (No. 2 Gas) Coal; elevation, 1045′ B.

		Feet	Inches
Slate, bluish gray		10	0
Coal, slaty	0′ 6″		
Coal, good, hard	2 1	2	7
Fire clay, pavement			

Logan District, Logan County.

As shown by Map II, the Campbell Creek (No. 2 Gas) Coal is above drainage in the northwestern part of Logan District, passes under drainage in the central portion along the Coalburg Syncline, and appears above water level again in the southern end of the district along Guyandot River only about one-third mile below the Triadelphia District Line.

In Chapter IV, the Campbell Creek Coal is noted in the sections for Clothier and Logan, and in Chapter VI, it is recorded in those for Hughey, Peach Creek, Whitman, Stollings and Rum Creek.

In the present Chapter, it is recorded in Coal Test Borings Nos. 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 47A, 49, 50, 73, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88 and 89, a few of which are in Boone County, east of Logan District. These tests show a large amount of coal available for mining, along the Coalburg Syncline. In the region southwest of the Guyandot River, none of the core tests reached the Campbell Creek Coal, but its presence farther west along the same syncline at Naugatuck, Mingo County, is strong evidence to support the theory that the coal is good along the entire length of the Coalburg Syncline in both Logan and Mingo Counties.

Some openings have been made on the waters of Guyandot River, below Logan.

The **Newton White Opening (No. 729 on Map II)**, on Long Fork of Mill Creek, 1.1 miles southeast of Pecks Mill, at an elevation of 1025′ B., was fallen shut when visited by Hennen, but the coal was reported 3 feet thick.

The following opening was examined by Hennen:

Richard White Farm Mine—No. 730 on Map II.

On Long Fork of Mill Creek, 1.5 miles southeast of Pecks Mill; Campbell Creek (No. 2 Gas) Coal, elevation, 1045' B.

			Feet	Inches
Sandstone, massive				
Coal, gas, blocky	0'	2½"		
Slate, black, coaly	0	3½		
Coal, gas, hard	2	4	2	10
Pavement				

Opening No. 731 on Map II, on Long Fork of Mill Creek, 1.7 miles southeast of Pecks Mill, at an elevation of 1025' B., was fallen shut when visited by Hennen, but the coal was reported 4 feet thick.

On Buffalo Creek, which empties into the Guyandot River at Henlawson, Reger and Gawthrop observed the two following openings:

Henry Lawson Prospect—No. 732 on Map II.

On Stonecoal Branch of Buffalo Creek, 1.8 miles southwest of Henlawson; Campbell Creek (No. 2 Gas) Coal; elevation, 940' B.

			Feet	Inches
Sandstone, massive			15	0
Shale, greenish gray			2	0
Coal, semi-splint	1'	7"		
Slate, dark gray	0	2		
Coal, splint	1	3	3	0
Fire clay				

Henry Lawson Prospect—No. 733 on Map II.

On Buffalo Creek, 2.5 miles southwest of Henlawson; Campbell Creek (No. 2 Gas) Coal; elevation, 935' B.

			Feet	Inches
Shale, gray			1	0
Coal, soft	0'	9"		
Coal, semi-splint	2	0	2	9
Fire clay				

On Crooked Creek, some openings have been made. The following was examined by Hennen:

Freeman Farm Mine—No. 734 on Map II.

On Crooked Creek, 1.8 miles northeast of Hughey; **Campbell Creek (No. 2 Gas) Coal**; elevation, 980′ B.

			Feet	Inches
Sandstone, massive, brown, fine grained, micaceous			5	0
Coal, gas	0′	2″		
Slate, black, coaly	0	4		
Coal, gas, hard	2	2		
Fire clay	0	6		
Slate, black, coaly	0	1	3	3
Fire clay and concealed			10	0
Sandstone, massive, cliff			30	0

Opening No. 735 on Map II, on Crooked Creek, 2 miles northeast of Hughey, at an elevation of 990′ B., was fallen shut when examined by Hennen, and the thickness could not be obtained.

On the waters of Hewett Creek, which heads against Crooked Creek, in the northern part of Logan District, some openings have been made in the Campbell Creek Coal.

The two following openings were examined by Hennen:

Coal Opening—No. 736 on Map II.

On Hewett Creek, 0.2 mile east of Lake; **Campbell Creek (No. 2 Gas) Coal**; elevation, 970′ B.

			Feet	Inches
Shale, sandy, dark			5	0
Coal, slaty	0′	4″		
Coal, semi-splint	2	1		
Shale, gray	0	4		
Coal, splint, hard	0	10	3	7
Fire clay				

Coal Opening—No. 737 on Map II.

On Hewett Creek, 1.3 miles northeast of Lake; **Campbell Creek (No. 2 Gas) Coal**; elevation, 935′ B.

			Feet	Inches
Shale, sandy, bluish			10	0
Coal, gas	0′	4″		
Coal, bony and slaty	0	6		
Coal, semi-splint	2	4		
Slate, gray	0	4		
Coal, hard, splint	1	0	4	6
Concealed				

The following prospect was examined by Gawthrop:

Coal Prospect—No. 738 on Map II.

On a branch of Hewett Creek, 0.9 mile northwest of Lake; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1070′ B.

			Feet	Inches
Shale, gray				
Coal	0′	8″		
Bone	0	4		
Coal	0	4	1	4
Slate				

In the vicinity of Logan, several prospects have been made in the Campbell Creek Coal. The best thickness obtained was at the **Aracoma Coal Company Opening (No. 739 on Map II),** 0.6 mile northwest of Logan, where this Company has driven a haulage tunnel through this seam to reach its incline to the Cedar Grove Coal above. As shown by the Logan Section, published in Chapter IV, the coal is 4 feet thick.

At **Prospect No. 740 on Map II,** on the east side of Guyandot River, 0.5 mile north of Logan, Reger observed 2′ 6″ of clean coal at an elevation of 790′ B.

The two following exposures were examined by Hennen, Reger and Gawthrop:

Coal Prospect—No. 741 on Map II.

On the west side of Guyandot River, opposite Logan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 740′ B.

			Feet	Inches
Shale, dark				
Coal, medium hard	1′	9″		
Shale, gray	0	1		
Coal, semi-splint	1	10	3	8
Fire clay			1	0

C. & O. Ry. Exposure—No. 742 on Map II.

On the southwest side of Guyandot River at the Logan bridge; **Campbell Creek (No. 2 Gas) Coal**; elevation, 725′ B.

			Feet	Inches
Sandstone			6	0
Coal semi-splint	1′	6″		
Slate, gray	0	1		
Coal	0	2	1	9
Sandstone				

On Mud Fork, which empties into Island Creek just west of Logan, the Campbell Creek Coal has been prospected extensively and found to be good coal, but too thin to compete with the great Cedar Grove seam above it.

The three following openings were examined by Gawthrop:

Coal Prospect—No. 743 on Map II.

On Lower Dempsey Branch of Mud Fork, 1.8 miles N. 80° W. of Logan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 720′ B.

			Feet	Inches
Sandstone				
Coal, with shale streaks	0′	7″		
Coal, semi-splint	2	6		
Shale, gray	0	2		
Coal, splint, visible	0	8	3	11
Concealed				

Coal Prospect—No. 744 on Map II.

On Lower Dempsey Branch of Mud Fork, 1.9 miles N. 75° W. of Logan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 760′ B.

			Feet	Inches
Sandstone				
Coal, slaty, soft	1′	2″		
Shale	0	0½		
Coal, semi-splint	1	8		
Slate	0	0½		
Coal, splint	1	0	3	11
Fire clay shale				

Coal Opening—No. 745 on Map II.

On Mud Fork, 1.7 miles N. 10° W. of Holden; **Campbell Creek (No. 2 Gas) Coal**; elevation, 775′ B.

			Feet	Inches
Sandstone, massive			5	0
Shale, gray			2	0
Coal, slaty	0′	8″		
Coal, semi-splint	2	0		
Coal, splint	1	4	4	0
Fire clay				

The following opening was examined by Reger and Gawthrop:

U. S. Coal & Oil Co. Opening—No. 746 on Map II.

On Mud Fork, 2.6 miles northwest of Holden; **Campbell Creek (No. 2 Gas) Coal**; elevation, 850′ B.

			Feet	Inches
Sandstone, massive			20	0
Shale, gray			5	0
Coal, semi-splint	2′	4″		
Coal, reported	1	0	3	4

The following prospect was examined by Gawthrop:

Thomas Avis Prospect—No. 747 on Map II.

On a branch of Mud Fork, 3.8 miles northwest of Holden; **Campbell Creek (No. 2 Gas) Coal**; elevation, 970′ B.

			Feet	Inches
Shale, sandy, with iron ore nodules			6	0
Coal, semi-splint	1′	2″		
Shale	0	0½		
Coal, harder	0	7		
Shale	0	0½		
Coal, splint	0	7	2	5
Fire clay shale				

A prospect along the roadside, examined by Reger and Gawthrop, shows the following:

Thomas Avis Prospect—No. 748 on Map II.

On Mud Fork, 4.3 miles northwest of Holden; **Campbell Creek (No. 2 Gas) Coal**; elevation, 970′ B.

			Feet	Inches
Shale, sandy, with iron ore			6	0
Slate, black			0	3
Shale, gray			0	7
Coal, medium hard	1′	0″		
Slate, gray	0	0½		
Coal, splint	0	8		
Slate, black	0	1		
Coal, splint	0	6	2	3½
Fire clay				

On Copperas Mine Fork of Island Creek, at Cora, the Cora Coal & Coke Co. drilled a water well at the mouth of a branch opposite the Cora Mine (No. 77 on Map II), where, according to Mr. C. W. Jones, Superintendent, the Campbell Creek Coal was found 72 feet below the surface, 4 feet thick, making its elevation 605′ B.

Triadelphia District, Logan County.

In Triadelphia District, the Campbell Creek (No. 2 Gas) Coal has been prospected extensively and found to be of good thickness and quality. Map II shows that it crops along the principal streams, being readily available for mining.

In Chapter IV, the coal is recorded in the section for Manbar, and in Chapter VI, it is noted in those for Accoville, Sherman, Robinette and Buffalo Creek.

At **Opening No. 749 on Map II,** on the Guyandot River, 0.3 mile southeast of Nibert Station, the entrance had fallen shut, but, according to Hennen, the length of the mine props indicated about 5 feet of coal, at an elevation of 710′ B.

The following mines operate the coal commercially:

Rich Creek Coal Co., Wilburn Mine—No. 133 on Map II.

On Guyandot River, 0.8 mile northwest of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 810′ B.

				Feet	Inches
1.	Sandstone, massive				
2.	Fire clay shale, 0″ to			0	6
3.	Coal, gas	1′	6″		
4.	Fire clay, 0″ to 2″	0	1		
5.	Coal, gas	0	11		
6.	Coal, splint	0	5		
7.	Coal, semi-splint	0	7		
8.	Coal, gas	0	9		
9.	Slate, 0″ to	0	1		
10.	Coal, gas	0	2	4	6
11.	Fire clay				

"Coal owned by Joe Hinchman; principal office, Logan; daily capacity. 200 tons; daily output, 150 tons; 8 laborers and 13 miners employed; electric haulage; used for steam; shipped west; no regular butts or faces; greatest rise, S. 20° E.; pocket compass determination; sample collected from Nos. 3, 5, 6, 7, 8 and 10 of section, in Room No. 5 off 2nd 'B' Entry, by R. M. Gawthrop; B. Lee Hutchinson, Superintendent, authority for data."

The composition of this sample is published under Mine No. 133 in the table at the end of this Chapter.

Manbar Coal Co. Mine—No. 134 on Map II.

On Guyandot River, 0.5 mile northwest of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 830′ B.

				Feet	Inches
1.	Shale, gray				
2.	Coal, gas	1′	4″		
3.	Shale	0	1		
4.	Coal, gas	1	6		
5.	Coal, splint	0	4		
6.	Coal, semi-splint	0	8		
7.	Coal, gas	1	4	5	3
8.	Fire clay shale				

"Coal owned by P. J. and N. J. Riley; principal office, Manbar; daily capacity, 350 tons; daily output, 250 tons; 10 laborers and 20 miners employed; mule haulage; used for steam and domestic fuel; shipped east and west; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 5, 6 and 7 of section in Smith's Heading, by R. M. Gawthrop; J. S. Riley, Superintendent, authority for data. Mine not working on date visited; sample collected from old working place; surface cleaned, but coal probably somewhat oxidized."

The composition of this sample is published under Mine No. 134 in the table at the end of this Chapter.

Logan Mining Co., Earling Mine—No. 135 on Map II.

On Guyandot River, 0.3 mile northwest of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 834′ L.

				Feet	Inches
1.	Shale, dark gray				
2.	Bone, 0″ to	0′	3″		
3.	Coal, gray	2	7½		
4.	Coal, splint	0	4½		
5.	Coal, gas	1	10	5	1
6.	Fire clay shale				

"Coal owned by McDonald Heirs; principal office, Fairmont; daily capacity, 900 tons; daily output, 600 tons; 34 laborers and 40 miners employed; mule and electric haulage; used for steam and coke; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 3, 4 and 5 of section, at face of No. 2 Flat, 250 feet above No. 8 'A', by R. M. Gawthrop; B. Lee Hutchinson, Superintendent, authority for data."

The composition of this sample is published under Mine No. 135 in the table at the end of this Chapter.

This Company has 10 bee-hive coke ovens in which the ¾-inch screenings, including the "bug dust" from the cutting machines, are used for making coke. The product of the ovens is shipped west for use in blast furnaces, with satisfactory results. A sample of 48-hour coke, collected from the stock pile by Gawthrop, gave the following results, according to Hite and Krak, Chemists of the Survey:

	Per cent.
Moisture	0.00
Volatile Matter	3.75
Fixed Carbon	85.17
Ash	11.08
Total	100.00
Sulphur	0.60
Phosphorus	0.007

Another specimen of this coke, sampled by B. Lee Hutchinson, Superintendent of the Logan Mining Company, and analyzed by the Hamilton Otto Coke Company, gives the following results, as submitted by Mr. Hutchinson:

	Per cent.
Moisture	0.00
Volatile Matter	1.88
Fixed Carbon	87.59
Ash	10.53
Total	100.00
Sulphur	0.78

The analyses show a coke exceptionally free from both sulphur and phosphorus, the two impurities most harmful for blast furnace use, while there is a sufficient percentage of ash to give the coke the necessary strength to stand shipment and to hold a load in the furnace.

Judging from the results shown above, it seems probable that an extensive coke industry might be developed in the Campbell Creek and other coals of the Kanawha Series, but the unusually high volatile content of these coals would make it extremely wasteful to utilize them in bee-hive ovens. Their use in by-product ovens, however, should prove highly successful if mixed with the low volatile Pocahontas Coals. Owing to their hard and splinty character, it would be necessary to run these coals through a crusher before charging the ovens. So far as known, no other attempt to manufacture coke from the coals of Logan and Mingo Counties has been made.

Some openings have been made in the Campbell Creek Coal along Rich Creek, where Hennen examined the two following prospects:

Coal Opening—No. 750 on Map II.

On Bee Hollow of Rich Creek, 2 miles southwest of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 930′ B.

			Feet	Inches
Sandstone, massive, Malden			15	0
Coal, gas	0′	5″		
Coal, splinty	1	10		
Coal, gas	0	8	2	11
Fire clay and concealed to run			30	0

Coal Opening—No. 751 on Map II.

On Pit Branch of Rich Creek, 2.8 miles southwest of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 965′ B.

			Feet	Inches
Sandstone, massive, great cliff, gray, medium grained, Malden			40	0
Coal, gas	0′	6″		
Coal, splinty	1	10		
Coal, gas	0	8	3	0
Fire clay, sandy				

Opening No. 752 on Map II, on Pine Branch of Guyandot River, 0.5 mile northeast of Manbar, at an elevation of 860′ B., was closed when visited, but 5 feet of coal was reported.

The following opening was examined by Hennen:

Coal Opening—No. 753 on Map II.

On Henry Hollow of Guyandot River, 1.7 miles east of Manbar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 865′ B.

					Feet	Inches
Sandstone, massive, brown, medium grained					20	0
Coal, bony			0′	3″		
Coal, gas, hard			2	2		
Slate, gray	0′	6″	0	8		
Coal	0	1				
Slate, gray	0	1				
Coal, splinty			2	9	5	10
Slate						

The twin slate near the middle of the section is a characteristic feature of the coal along the river in this neighborhood and along Buffalo Creek.

Along Buffalo Creek, which empties into the Guyandot at Man, the Campbell Creek (No. 2 Gas) Coal has been prospected extensively and is being mined commercially.

The following opening was examined by Hennen:

Coal Opening—No. 754 on Map II.

On Buffalo Creek, 0.2 mile north of Kistler Station; **Campbell Creek (No. 2 Gas) Coal**; elevation, 882′ L.

			Feet	Inches
Shale, gray			2	0
Coal, slaty	0′	6″		
Shale, gray	0	11		
Coal, gas	1	3		
Bone	0	1		
Coal, gas	2	1		
Slate, gray	0	1		
Coal	0	1		
Shale, gray	0	3		
Coal, gas, hard	0	9		
Coal, gray splint	0	10		
Coal, gas, hard	1	8	8	6
Slate				

The two following mines operate the coal commercially:

Summers Coal Co. Mine—No. 136 on Map II.

On Buffalo Creek, 0.3 mile east of Lax Station; **Campbell Creek (No. 2 Gas) Coal**; elevation, 940′ B.

				Feet	Inches
1.	Shale, dark gray				
2.	Coal, gas	0′	9½″		
3.	Bone	0	0½		
4.	Coal, gas	0	1		
5.	Bone	0	0½		
6.	Coal, gas	0	6		
7.	Shale, 0″ to	0	0½		
8.	Coal, gas	0	9		
9.	Coal, slaty	0	2		
10.	Coal, gas	0	7		
11.	Shale	0	4		
12.	Coal	0	1		
13.	Shale	0	8		
14.	Coal, gas	0	8		
15.	Coal, splint	0	2		
16.	Coal, semi-splint	1	0		
17.	Coal, gas	1	0	6	11
18.	Shale				

"Coal owned by H. G. Burgess; principal office, Accoville; daily capacity, 250 tons; daily output, 200 tons; 10 laborers and 20 miners employed; used for steam, domestic and gas fuel; shipped east and west; mule haulage; no regular butts or faces; greatest rise, southeast; sample collected from Nos. 2, 4, 6, 8, 10, 12, 14, 15 and 16 of section in 3rd Left Heading, by R. M. Gawthrop; H. B. Summers, Operator, authority for data; mine not working on date visited; sample collected from old working place, surface cleaned, but coal probably somewhat oxidized."

The composition of the sample is published under Mine No. 136 in the table at the end of this Chapter.

Avon Coal Co. Mine—No. 137 on Map II.

On Right Fork of Buffalo Creek, 0.4 mile southeast of Accoville; Campbell Creek (No. 2 Gas) Coal; elevation, 935′ B.

				Feet	Inches
1.	Sandstone, massive, visible			10	0
2.	Shale, bluish gray, 0″ to			5	0
3.	Coal			0	6
4.	Shale, gray, 0″ to			3	0
5.	Coal, gas	0′	11″		
6.	Bone	0	1		
7.	Coal, gas	2	3		
8.	Shale, gray	0	2		
9.	Coal, gas	0	1		
10.	Shale, gray	0	5		
11.	Coal, gas	0	10		
12.	Coal, gray splint	0	4		
13.	Coal, gas	2	3	7	4
14.	Fire clay shale				

"Sample collected from Nos. 5, 7, 11, 12 and 13 of section, in Room No. 14 off 2nd West Entry, by R. M. Gawthrop; L. E. Scholl, Superintendent, authority for data. No. 2 of section disappears in parts of the mine, giving a sandstone top; No. 4 of section is absent in some places and the mining section is then increased by No. 3 of section. See Mine No. 92 on Map II under Cedar Grove Coal for other data."

The composition of the sample is published under Mine No. 137 in the table at the end of this Chapter.

The following opening was examined by Gawthrop:

Coal Opening—No. 755 on Map II.

On Right Fork of Buffalo Creek, 2.2 miles southeast of Accoville; Campbell Creek (No. 2 Gas) Coal; elevation, 1145′ B.

			Feet	Inches
Shale, dark, gray, sandy			5	0
Coal, gas	0′	9″		
Shale, gray	0	1		
Coal, slaty	0	2		
Coal, splinty	0	6		
Bone	0	1		
Coal, semi-splint	0	8		
Coal, softer	1	2		
Shale, gray	0	1		
Coal, gas	0	5	3	11
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 756 on Map II.

On Right Fork of Buffalo Creek, 3.2 miles S. 75° E. of Accoville; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1190′ B.

			Feet	Inches
Sandstone, flaggy			5	0
Coal, splint	1′	4″		
Coal, semi-splint	0	11		
Slate	0	0¼		
Coal, splint	0	5¾	2	9
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 757 on Map II.

On Hinchman Hollow of Buffalo Creek, 0.5 mile northeast of Accoville; **Campbell Creek (No. 2 Gas) Coal**; elevation, 890′ B.

			Feet	Inches
Shale, sandy			15	0
Coal, gas	0′	4″		
Coal, slaty	0	5		
Coal, gas	2	0		
Slate	0	0½		
Coal	0	1		
Shale	0	1½		
Coal, hard	0	10		
Slate	0	0¼		
Coal, splint, visible	1	2	5	0¼
Concealed				

The two following mines operate the coal commercially:

Huddleson Coal Co. Mine—No. 138 on Map II.

On Buffalo Creek, 0.6 mile northeast of Accoville; **Campbell Creek (No. 2 Gas) Coal**; elevation, 905′ B.

				Feet	Inches
1.	Shale, dark gray			10	0
2.	Coal, gas	0′	10″		
3.	Bone	0	1		
4.	Coal, gas	0	1		
5.	Bone	0	0½		
6.	Coal, gas	2	0		
7.	Shale, gray	0	2½		

				Feet.	Inches.
8.	Coal, gas	0′	1″		
9.	Shale, gray	0	3		
10.	Coal, gas	0	10		
11.	Coal, splint	0	4		
12.	Coal, gas	0	10		
13.	Coal, splinty	0	1½		
14.	Coal, gas	0	7	6	3½
15.	Shale				

"Coal owned by Burgess and Browning Heirs; principal office, Accoville; daily capacity, 300 tons; daily output, 200 tons; 8 laborers and 12 miners employed; mule haulage; used for steam and domestic fuel; shipped east and west; no butts or faces; greatest rise, S. 20° E.; pocket compass determination; sample collected from Nos. 2, 6, 10, 11, 12, 13 and 14 of section, at face of No. 5 St. Heading, 300 feet above 1st Left Heading, by R. M. Gawthrop; J. F. Likens, authority for data."

The composition of this sample is published under Mine No. 138 in the table at the end of this Chapter.

Virginia-Buffalo Coal Co., Mine No. 2—No. 139 on Map II.

On Buffalo Creek, 1.2 miles northeast of Accoville; **Campbell Creek (No. 2 Gas) Coal**; elevation, 905′ B.

				Feet	Inches
1.	Shale, bluish gray				
2.	Coal, gas	1′	3″		
3.	Bone	0	1		
4.	Coal, gas	0	1		
5.	Bone	0	1		
6.	Coal, gas	1	9		
7.	Shale, gray	0	1		
8.	Coal	0	1		
9.	Shale, gray	0	1		
10.	Coal, gas	0	10		
11.	Shale, gray	0	2		
12.	Coal, splint	0	7		
13.	Coal, semi-splint	0	10		
14.	Coal, gas	1	2	7	1
15.	Fire clay				

"Coal owned by L. D. and V. B. Browning and Hiram Burgess; principal office, Huntington; daily capacity, 300 tons; daily output, 200 tons; 25 laborers and miners employed; mule haulage; used for steam; shipped west; no butts or faces; greatest rise, southeast; sample collected from Nos. 2, 6, 10, 12, 13 and 14 of section, at face of Main Entry, 100 feet above 3rd Right Entry, by R. M. Gawthrop; R. V. Waldron, Foreman, authority for data."

The composition of this sample is published under Mine No. 139 in the table at the end of this Chapter.

The following opening was examined by Gawthrop:

Coal Opening—No. 758 on Map II.

On Buffalo Creek, at Robinette; **Campbell Creek (No. 2 Gas) Coal**; elevation, 930' B.

			Feet	Inches
Sandstone, brown			1	0
Coal, gas	0'	11"		
Coal, slaty	0	7		
Coal, soft	0	10		
Coal, harder	1	6	3	10
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 759 on Map II.

On Buffalo Creek, 0.2 mile southwest of Sydnor Station; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1061' L.

			Feet	Inches
Sandstone, grayish brown, flaggy, micaceous			3	0
Coal, soft	0'	10"		
Coal, slaty	0	8		
Coal, medium hard	2	0	3	6
Slate				

The following opening was examined by Gawthrop:

Coal Opening—No. 760 on Map II.

On Cartwright Branch of Buffalo Creek, 0.3 mile southeast of Poplar; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1102' L.

			Feet	Inches
Shale, sandy, with iron ore nodules			5	0
Coal, gas	1'	2"		
Coal, slaty	0	5		
Coal, harder	1	0		
Coal, splint	1	5	4	0
Shale				

The following exposure was examined by Hennen in a railroad cut:

C. & O. Ry. Exposure—No. 761 on Map II.

On Buffalo Creek, 0.3 mile southwest of Stow; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1050′ B.

				Feet	Inches
Slate, black, laminated				6	0
Coal, soft	0′	6½″	“Rider”	1	10
Slate, gray	0	0½			
Coal, harder	1	3			
Shale, dark, gray, laminated				7	0
Concealed				9	0
Shale, dark gray				5	0
Coal	0′	2″			
Slate, gray	0	3			
Coal, gas	0	8			
Shale, gray	0	1			
Coal	0	1			
Slate, gray	0	1			
Coal, bony	0	3			
Coal, gas	1	1			
Coal, splint	0	10			
Coal, gas	0	6		4	0
Fire clay				1	0

The two following exposures were examined by Hennen along Buffalo Creek:

Coal Exposure—No. 762 on Map II.

On Buffalo Creek, 0.5 mile west of Craneco; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1105′ B.

			Feet	Inches
Sandstone, massive, great cliff			40	0
Coal	0′	4″		
Slate, gray	0	2		
Coal	0	1		
Slate	0	2		
Coal	1	3	2	0
Concealed by water				

Coal Exposure—No. 763 on Map II.

On Buffalo Creek, 0.7 mile east of Craneco; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1185′ B.

			Feet	Inches
Sandstone, massive, medium grained, gray			30	0
Shale, gray			0	6
Coal gas	0′	9″		
Slate, dark gray	0	0½		
Coal, slaty	0	3		
Coal, gas	2	3	3	3½
Fire clay and concealed to bed of Buffalo Creek			6	0

On Buffalo Creek above Craneco, a local split separates the Campbell Creek (No. 2 Gas) Coal into two benches, but the coal goes under drainage too soon to follow this development very far. The following opening, examined by Hennen, represents the upper bench:

Coal Opening—No. 140 on Map II.

On Buffalo Creek, 2.3 miles northeast of Craneco; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1325′ B.

				Feet	Inches
1.	Shale, black, laminated			6	0
2.	Coal, gas	1′	1″		
3.	Slate	0	1		
4.	Coal, gas	1	9		
5.	Bone	1	4	4	3
6.	Sandstone, massive				

A sample was collected from Nos. 2 and 4 of section, the composition of which is published under Mine No. 140 in the table at the end of this Chapter. The analysis shows a good grade of coal.

Some prospects have been made in the Campbell Creek (No. 2 Gas) Coal along Huff Creek. The three following openings were examined by Hennen:

Coal Opening—No. 764 on Map II.

On Huff Creek, 0.4 mile southwest of Cyclone; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1175′ B.

				Feet	Inches
Shale, dark				7	0
Coal, gas, soft, upper bench				3	1
Fire clay and shale				16	0
Coal, gas, soft	0′	3½″	Lower Bench	1	0
Slate, black	0	4			
Coal, gas, soft	0	4½			

Coal Opening—No. 765 on Map II.

On Muddy Bridge Branch of Huff Creek, 1.7 miles northeast of Cyclone; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1250' B.

			Feet	Inches
Shale				
Coal, gas, soft	0'	2"		
Shale, gray	1	0		
Coal, gas, soft	3	5		
Shale, gray	1	2		
Coal, gas, soft	1	0		
Shale, gray	2	0		
Coal, gas, harder	2	8	11	5
Shale, gray				

Coal Opening—No. 766 on Map II.

On Huff Creek, 1.7 miles east of Cyclone; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1290' B.

			Feet	Inches
Sandstone, massive			40	0
Concealed and shale			20	0
Coal	0'	2"		
Shale, gray	1	2		
Coal, gas	4	0	5	4

The following opening was examined by Hennen farther south, on Elk Creek:

Coal Opening—No. 767 on Map II.

On Old Fork of Elk Creek, 1.5 miles northeast of Christian; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1250' B.

			Feet	Inches
Shale, sandy				
Coal, gas	1'	5"		
Coal, cannelly	0	4		
Coal, gas	1	2	2	11

Harvey District, Mingo County.

In Harvey District, there is little information available concerning the Campbell Creek (No. 2 Gas) Coal. Its horizon is entirely under drainage and the only boring that has pierced it is the gas well at Dingess, (No. 103 on Map II), the record of which was used in the section for Dingess, published in Chapter IV. This well record shows no Campbell Creek (No.

2 Gas) Coal, but the fact that the coal is good in Chapmanville and Logan Districts, Logan County, on the east, and in Warfield and Hardee Districts, on the south and west, is strong evidence to support the belief that there is a large amount of good Campbell Creek Coal in Harvey District.

Warfield District, Mingo County.

In Warfield District, the Campbell Creek (No. 2 Gas) Coal is brought above drainage by the Warfield Anticline in the vicinity of Kermit, where it shows good thickness and quality and is mined commercially.

In Chapter IV, the coal is noted in the section for Kermit and in Chapter VI, it is recorded in that for Marrowbone. In Chapter VII, it is recorded in the logs of several gas wells in the district.

The following opening was examined by Reger along Marrowbone Creek:

M. H. Waldron Opening—No. 768 on Map II.

On Marrowbone Creek, 1 mile northeast of Kermit; **Campbell Creek (No. 2 Gas) Coal**; elevation, 620′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	7½″		
Coal, laminated with slate	0	1½		
Coal	2	6		
Bone	0	1		
Coal	0	6	3	10
Slate, concealed, and sandstone to creek			15	0

At **Opening No. 769 on Map II,** on Marrowbone Creek, 1.5 miles northeast of Kermit, the Campbell Creek (No. 2 Gas) Coal is 3′ 2″ thick, as shown by the Marrowbone Section, published in Chapter VI.

The three following openings were examined by Reger:

Coal Opening—No. 770 on Map II.

On Marrowbone Creek, 1.6 miles southwest of Spaulding; **Campbell Creek (No. 2 Gas) Coal**; elevation, 610′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	3″		
Coal, laminated with slate	0	2		
Coal	2	11	3	4
Fire clay shale to creek				

Coal Opening—No. 771 on Map II.

On Left Fork of Marrowbone Creek, 1.4 miles southwest of Spaulding; **Campbell Creek (No. 2 Gas) Coal**; elevation, 617′ L.

			Feet	Inches
Sandstone, massive			40	0
Coal, slaty	0′	2″		
Coal	0	6		
Coal, laminated with slate	0	2		
Coal, splinty	1	9	2	7
Fire clay				

Coal Opening—No. 772 on Map II.

On Marrowbone Creek, 1.5 miles southwest of Spaulding; **Campbell Creek (No. 2 Gas) Coal**; elevation, 635′ B.

			Feet	Inches
Sandstone, massive				
Coal	0′	5″		
Coal, laminated with slate	0	3		
Coal, semi-splint	1	11		
Bone	0	1		
Coal	0	8	3	4
Shale				

The following mine, which operates the coal by shaft, was examined and sampled by Hennen and the results published in Volume II(A), page 402, of the State Survey Reports, under the name of the Warfield Coal Co.:

Grey Eagle Coal Co. Mine—No. 141 on Map II.

On Tug Fork, 0.8 mile northwest of Kermit; **Campbell Creek (No. 2 Gas) Coal**; elevation, 578′ L.

				Feet	Inches
1.	Sandstone				
2.	Coal, semi-splint, hard	3′	4″		
3.	Slate, gray	0	1		
4.	Coal, semi-splint	0	7		
5.	Bone	0	0½		
6.	Coal, splint	0	3½	4	4
7.	Slate				

"Principal office, Blocton; butts, N. 40° W.; faces, N. 50° E.; greatest rise, S. 50° E.; mine capacity, 6,500 tons monthly; men employed, 60; horse haulage; coal shipped east and west for steam purposes; authority for mine data (revised in 1913), L. J. Blankenship, Superintendent; sample for analysis from Nos. 2, 4 and 6 of section."

The composition of the sample is published under Mine No. 141 in the table at the end of this Chapter.

The following exposure was examined by Hennen and Reger along a railroad cut:

N. & W. Ry. Exposure—No. 773 on Map II.

On Tug Fork, at the south edge of Kermit; **Campbell Creek (No. 2 Gas) Coal**; elevation, 627' L.

			Feet	Inches
Sandstone, massive			20	0
Coal, splint	3'	5"		
Coal, bony	0	5		
Coal, splint	1	1	4	11
Fire clay and sandstone to ditch			3	0

The following opening was examined by Hennen and Reger:

Coal Opening—No. 774 on Map II.

On Lower Burning Creek, near its mouth, 0.4 mile southeast of Kermit; **Campbell Creek (No. 2 Gas) Coal**; elevation, 623' L.

			Feet	Inches
Sandstone, massive			35	0
Coal, splinty	3'	5"		
Bone	0	3		
Coal	0	11	4	7
Fire clay				

The following exposure was examined by Hennen at an old opening along the railroad a few feet east of the Warfield Fault:

N. & W. Ry. Opening.—No. 775 on Map II.

On Tug Fork, 0.8 mile southeast of Kermit; **Campbell Creek (No. 2 Gas) Coal**; elevation, 625' B.

	Feet	Inches
Shale, dark	15	0
Coal, splinty	5	4
Fire clay		

Hardee District, Mingo County.

In Hardee District, the Campbell Creek (No. 2 Gas) Coal is entirely under drainage. The only evidence concerning it is that furnished by the records of two coal test borings, Nos. 154 and 155, located along Pigeon Creek above Naugatuck, one of which (154) was used in compiling the section for Naugatuck, published in Chapter IV, page 70, the Campbell Creek (No. 2 Gas) Coal being 5′ 3½″ thick, with a shale parting 11″ thick near the middle. The record of the other coal test (155) is published in the first part of the present Chapter and shows 4′ 11″ of coal, of which 9″ is shale, located near the middle of the seam.

This evidence at the middle of the district, coupled with the fact that the coal is good where it crops both northwest and southeast, leads to the belief that the Campbell Creek (No. 2 Gas) Coal is good throughout a large part of the Hardee District.

Lee District, Mingo County.

In Lee District, the Campbell Creek (No. 2 Gas) Coal is good in the region of its outcrop along Tug Fork. In the northern part of the district, it is evidently under drainage and there is no local evidence concerning it. Several coal test borings were made along Rockhouse Fork of Pigeon Creek, but the records could not be obtained by the Survey, thus leaving the presence of the Campbell Creek (No. 2 Gas) Coal in this region subject to doubt until positive evidence is secured. Its presence in the surrounding regions, however, is an indication that it is probably good coal in a large part of Lee District.

In Chapter IV, the Campbell Creek (No. 2 Gas) Coal is noted in the sections for Chattaroy, Rawl, Sprigg, and Little Coon Knob.

At the following mine the Campbell Creek (No. 2 Gas) Coal was examined and sampled by Hennen and the results published in Volume II(A), page 403, of the State Survey Reports:

Rawl Coal & Coke Co. Mine—No. 141A on Map II.

On Tug Fork at Rawl; **Campbell Creek (No. 2 Gas) Coal**; elevation, 680′ B.

				Feet	Inches
0.	Slaty shale with fossil plants				
1.	Coal, Alma (at Merrimac mine)			3	6
2.	Slate, massive sandstone, and slate			110	0
3.	Draw slate, fossil plants, 3″ to			0	8
4.	Coal, gas	0′	4½″		
5.	Coal, interlaminated with slate	0	7		
6.	Coal, semi-splint	2	1		
7.	Coal, splint	0	8	3	8½

"Both butts and faces irregular; greatest rise, S. 42° E. (2 per cent.); mine capacity, 150 tons; men employed, 35; coal shipped mostly east and west for steam and domestic purposes; authority for mine data, R. N. Taylor, Superintendent; sample from Nos. 4, 6 and 7 for analysis."

The composition of this sample is published under Mine No. 141A in the table at the end of this Chapter.

At **Opening No. 776 on Map II,** on Tug Fork, 0.3 mile southeast of Rawl, Hennen observed 3 feet of coal, at an elevation of 695′ B.

The coal was once mined in connection with the Alma seam above it at the plant of the White Star Mining Co., at Merrimac. The opening in the Campbell Creek (No. 2 Gas) has been abandoned, but the following section was measured by Hennen:

White Star Mining Co. Mine (Abandoned)—
No. 777 on Map II.

On Tug Fork at Merrimac; **Campbell Creek (No. 2 Gas) Coal**; elevation, 710′ B.

			Feet	Inches
Shale, sandy, with plant fossils and iron ore nodules			15	0
Coal	0′	0½″		
Shale, gray	0	5		
Coal, gas, hard	0	6		
Coal, slaty, hard	0	6		
Coal, semi-splint	2	5	3	10½

The following opening was examined by Hennen:

Coal Opening—No. 778 on Map II.

On Tug Fork at Sprigg; **Campbell Creek (No. 2 Gas) Coal**; elevation, 775' B.

			Feet	Inches
Sandstone, massive			7	0
Shale, dark			6	0
Coal, gas	0'	6"		
Coal, interlaminated with thin slate layers	0	5		
Coal, gas	1	1		
Fire clay shale with dark streaks	0	8		
Coal, gas	2	6	5	2
Fire clay				

The following opening was examined by Hennen and Gawthrop:

Coal Opening—No. 779 on Map II.

On Tug Fork, 1.1 miles north of Sprigg; **Campbell Creek (No. 2 Gas) Coal**; elevation, 730' B.

			Feet	Inches
Shale				
Coal, gas	0'	3"		
Coal, slaty	0	6		
Coal, gas	1	4		
Shale, gray	0	1		
Coal, gas	0	0½		
Slate, gray	1	3		
Coal, gas	2	1	5	6½
Slate				

Williamson District, Mingo County.

In Williamson District, some openings have been made in the Campbell Creek (No. 2 Gas) Coal that show good thickness and quality.

In Chapter IV, the coal is noted in the section for Williamson.

The following opening was examined by Hennen:

Coal Opening—No. 780 on Map II.

On Tug Fork at the mouth of Sycamore Creek, 1.5 miles southeast of Williamson; Campbell Creek (No. 2 Gas) Coal; elevation, 660′ B.

			Feet	Inches
Shale, sandy, dark			6	0
Coal, interlaminated with thin slate layers	0′	9″		
Coal, gas, hard	2	0		
Coal, splinty	1	0		
Coal, gas, hard	0	3	4	0
Slate				

Magnolia District, Mingo County.

In Magnolia District, the Campbell Creek (No. 2 Gas) Coal has been prospected in a few places and shows fair quality. Except along Pigeon Creek at the north, where it is under drainage, the coal crops along the principal streams and is readily available for mining purposes, but the superior quality of the other coals above it has retarded its development.

In Chapter IV, the Campbell Creek (No. 2 Gas) Coal is noted in the sections for Matewan and Cedar, and in Chapter VI, it is recorded in those for Maritime Mine, Rose Siding, and Thacker.

Some prospects have been made along Mate Creek where Hennen and Gawthrop observed the three following openings:

Coal Opening—No. 781 on Map II.

On Mate Creek, 1.5 miles west of Meador; Campbell Creek (No. 2 Gas) Coal; elevation, 1000′ B.

			Feet	Inches
Sandstone, massive			5	0
Coal, gas	1′	5″		
Shale	0	0½		
Coal, gas	0	3		
Shale	0	2		
Coal	0	1½		
Shale	0	1½		
Coal	1	3	3	4½
Shale				

Coal Exposure—No. 782 on Map II.

On Mate Creek, 1.2 miles northwest of Meador; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1030′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	1′	9″		
Coal, harder, visible	1	3	3	0
Concealed				

Coal Opening—No. 783 on Map II.

On Mate Creek, 0.8 mile northwest of Meador; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1060′ B.

			Feet	Inches
Sandstone, massive				
Coal, gas	1′	11″		
Coal, harder, visible	0	5	2	4
Concealed				

The following opening was examined by Gawthrop on another creek:

Coal Opening—No. 784 on Map II.

On Righthand Fork of Buck Creek, 1.8 miles S. 5° E. of Hinch; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1295′ B.

			Feet	Inches
Shale, very sandy			10	0
Coal, gas	0′	2″		
Slate, black	0	1		
Coal, gas, slaty	0	10		
Coal, gas, hard	1	0		
Shale, gray	0	6		
Coal, gas	0	7	3	2
Shale				

The following opening was examined by Hennen:

Coal Opening—No. 785 on Map II.

On Beech Creek at Hinch; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1223′ L.

			Feet	Inches
Sandstone dark, shaly			20	0
Coal	0′	5″		
Shale, dark	5	0½		
Coal, gas	0	4		

			Feet.	Inches.
Shale, gray	0′	5″		
Coal, gas	1	6		
Coal, slaty	0	5		
Sandstone, gray	2	5		
Coal, gas	0	4		
Shale, gray	1	1		
Coal	0	0½	12	0
Shale, gray, with iron ore nodules, to bed of creek			10	0

Stafford District, Mingo County.

In Stafford District, the Campbell Creek (No. 2 Gas) Coal crops well up in the hills so that it is readily available for prospecting. Some openings have been made and the coal has been mined commercially.

In Chapter IV, the Campbell Creek (No. 2 Gas) Coal is noted in the section for War Eagle, and in Chapter VI, it is recorded in that for Browning Fork, where it shows two separate benches.

The following opening was examined by Gawthrop in the western part of the district:

Coal Opening—No. 786 on Map II.

On Left Fork of Bens Creek, 0.4 mile south of Domestic; Campbell Creek (No. 2 Gas) Coal; elevation 1250′ B.

			Feet	Inches
Sandstone, massive			6	0
Coal, gas, soft	0′	10″		
Coal, gas, harder	2	0	2	10
Shale				

The coal has been mined commercially along Turkey Creek, but none of these mines is at present in operation. There it is known as the "Upper War Eagle".

The following mine in the Campbell Creek (No. 2 Gas) Coal was examined and sampled by Hennen and the results published in Volume II(A), page 330, of the State Survey Reports, the coal being classified provisionally as **"Upper War Eagle":**

War Eagle Coal Co., Star Mine—No. 142 on Map II.

On Star Fork of Turkey Creek, 1 mile N. 25° W. of War Eagle; Campbell Creek (No. 2 Gas) Coal; elevation, 1610′ B.

				Feet	Inches
1.	Sandstone, roof, good				
2.	Draw slate, 4″ to	0′	6″		
3.	Coal, bony, 0″ to	0	2		
4.	Coal, gas, medium hard	2	5		
5.	Slate, gray	0	3½		
6.	Coal, gas, medium hard	1	11	5	3½

"Principal office, War Eagle; greatest rise, southeast; faces, irregular; mine capacity, 225 tons; men employed, 60; shipped east and west, mostly for steam; authority for mine data, Geo. W. Coffey, Superintendent; sample from Nos. 4 and 6 for analysis."

The composition of this sample is published under Mine No. 142 in the table at the end of this Chapter.

The following mine in the Campbell Creek (No. 2 Gas) Coal was examined and sampled by Hennen and the results published in Volume II(A), page 331, of the State Survey Reports, the coal being classified provisionally as the **"Upper War Eagle"**:

Margaret Mining Co., Margaret Mine No. 2— No. 143 on Map II.

On Turkey Creek, 1.7 miles N. 58° E. of War Eagle; Campbell Creek (No. 2 Gas) Coal; elevation, 1635′ B.

				Feet	Inches
1.	Sandstone				
2.	Draw slate, 0″ to	6′	0″		
3.	Coal, gas, medium hard	3	0		
4.	Slate, gray	0	2		
5.	Coal, gas	0	3		
6.	Coal, splinty, hard	0	2		
7.	Coal, gas, medium hard, sulphur bands	1	11	5	6

"Greatest rise, southeast; faces, irregular; mine capacity, 150 tons; men employed, 40; coal shipped east and west, mostly for steam; authority for mine data, A. H. Dangerfield, Superintendent; sample from Nos. 3, 5, 6 and 7 for analysis."

The composition of the sample is published under Mine No. 143 in the table at the end of this Chapter.

The following mine in the Campbell Creek (No. 2 Gas) Coal was examined and sampled by Hennen and the results published in Volume II(A), page 331, of the State Survey Reports, the coal being classified provisionally as **"Upper War Eagle"**:

War Eagle Coal Co., War Eagle Mine—No. 144 on Map II.

On Turkey Creek, 2.0 miles N. 65° W. of War Eagle; Campbell Creek (No. 2 Gas) Coal; elevation, 1656′ L.

			Feet	Inches
1.	Sandstone			
2.	Draw slate, 0″ to		0	8
3.	Coal, bony	0′ 7″		
4.	Coal, gas, medium hard	5 8	6	3
5.	Slate and shaly sandstone		15	0
6.	Coal, gas		1	0

"Principal office, War Eagle; greatest rise, southeast; faces, irregular; mine capacity, 400 tons; men employed, 75; this coal and the coal from the 'Mephisto' mine of the same Company, in the 'Middle War Eagle' seam (now known as Eagle, 1914), 225 to 235 feet below, both sent down to Turkey Creek over the same incline, and the coal is usually mixed, there being such a slight difference in the quality of the two seams; sample from No. 4 for analysis."

The composition of this sample is published under Mine No. 144 in the table at the end of this Chapter.

At **Prospect No. 787 on Map II,** on Turkey Creek, 1.8 miles northeast of War Eagle, the coal was 5 feet thick, as shown by the section for War Eagle, published in Chapter IV.

On the waters of Guyandot River, some openings have been made in the Campbell Creek (No. 2 Gas) Coal.

The following opening was examined by Hennen:

Coal Opening—No. 788 on Map II.

On Horsepen Creek, 4 miles northwest of Horsepen; Campbell Creek (No. 2 Gas) Coal; elevation, 1165′ B.

	Feet	Inches
Sandstone, massive	10	0
Shale, bluish gray	5	0
Coal, gas	2	0
Shale, gray, and concealed, to creek	10	0

The following opening was examined by Hennen:

Coal Opening—No. 789 on Map II.

On Browning Fork, 3.4 miles northwest of Horsepen; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1185′ B.

					Feet	Inches
Sandstone, flaggy, with sandy shale					15	0
Coal, gas	1′	5″	2′	7″		
Shale, gray	0	7				
Coal, gas	0	7				
Shale, gray			0	6		
Sandstone, massive, shaly			5	0		
Coal, gas	0′	9″	1	5		
Shale, gray	0	4				
Coal, hard	0	4			9	6
Shale						

The following opening was examined by Hennen:

Julius Carter Farm Mine—No. 790 on Map II.

On Gilbert Creek, 3.8 miles southwest of Gilbert; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1550′ B.

				Feet	Inches
1.	Sandstone, shaly			8	0
2.	Coal, gas	0′	2″		
3.	Coal, laminated with thin streaks of slate	0	6		
4.	Coal, gas	2	5		
5.	Shale, gray, reported	0	10		
6.	Coal, reported	3	0	6	11
7.	Slate				

Mr. Carter is authority for Nos. 5 and 6 of section, as this part was concealed by debris.

The following opening was examined by Gawthrop:

Coal Opening—No. 791 on Map II.

On Mudlick Branch of Gilbert Creek. 2.5 miles S. 10° W. of Gilbert; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1530′ B.

			Feet	Inches
Coal, gas	0′	3″		
Coal, slaty	1	2		
Coal, gas	2	3		
Shale, gray	0	0¾		
Coal, gas	0	6		
Shale, gray	0	0½		
Coal, gas, hard	1	11	6	2½
Slate				

The following opening was examined by Gawthrop:

Coal Opening—No. 792 on Map II.

On Biglick Branch of Gilbert Creek, 3.3 miles northeast of War Eagle; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1565′ B.

			Feet	Inches
Sandstone, massive			3	0
Shale, dark gray			8	0
Coal, gas	0′	3″		
Coal, slaty	0	10		
Coal, gas	2	4		
Slate	0	0½		
Coal, gas	0	3		
Slate	0	0½		
Coal, gas	1	0	4	9
Slate				

The following opening was examined by Hennen:

Coal Opening—No. 793 on Map II.

On Steer Hollow of Gilbert Creek, 0.5 mile east of the common corner of Mingo, McDowell and Wyoming Counties; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1785′ B.

			Feet	Inches
Shale, dark, with plant fossils			5	0
Coal, gas	0′	3″		
Coal, interlaminated with thin slaty layers	0	6		
Coal, gas, soft, columnar	3	5		
Coal, splinty	0	7	4	9
Slate				

Quantity of Campbell Creek (No. 2 Gas) Coal Available.

Based on the evidence of the preceding pages and with a planimetric determination of the area by Gawthrop, the following estimate is made of the probable amount of Campbell Creek (No. 2 Gas) Coal. As stated previously under the discussion by districts, it is believed that there is Campbell Creek (No. 2 Gas) Coal of commercial thickness and purity in every district of the two counties. No deduction is made for the amount already mined, as it is insignificant when compared to the total.

Probable Amount of Campbell Creek (No. 2 Gas) Coal.

Counties by Districts	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal	Short Tons of Coal.
Logan:					
Chapmanville	2	68.35	43,744	3,810,977,280	152,439,091
Logan	3	236.10	151,104	19,746,270,720	789 850,828
Triadelphia	3	102.20	65,408	8,547,517,440	341,900,698
Totals	......	406.65	260,256	32,104,765,440	1,284,190,617
Mingo:					
Harvey	2	68.35	43,744	3,810,977,280	152,439,091
Warfield	3	37.67	24,109	3,150,564,120	126,022,564
Hardee	3	75.63	48,403	6,325,304,040	253 012,161
Lee	3	71.05	45,472	5,942,280,960	237,691,238
Williamson	3	3.10	1,984	259,269,120	10,370,765
Magnolia	3	58.30	37,312	4,875,932,160	195,037,287
Stafford	4	42.45	27,168	4,733,752,320	189,350,094
Totals	......	356.55	228,192	29,098,080,000	1,163,923,200
Totals for both Counties		763.20	488,448	61,202,845,440	2,448,113,817

THE EAGLE COAL.

The Eagle Coal, which has been described briefly in Chapter VI, pages 203-4, is of only secondary importance compared to many other seams of the Kanawha Series. So far as known, it exists in minable thickness and purity only in Triadelphia District, Logan County, and in Stafford District, Mingo County, but as its horizon is in most regions under drainage, its actual extent will remain open to some question until more core drilling has been done. Its crop is shown on Map II and the region where it is known or believed to be of minable thickness and quality is shown on Figure 18.

Chapmanville District, Logan County.

In Chapmanville District, the Eagle Coal horizon is above drainage along the Guyandot River above Crawley

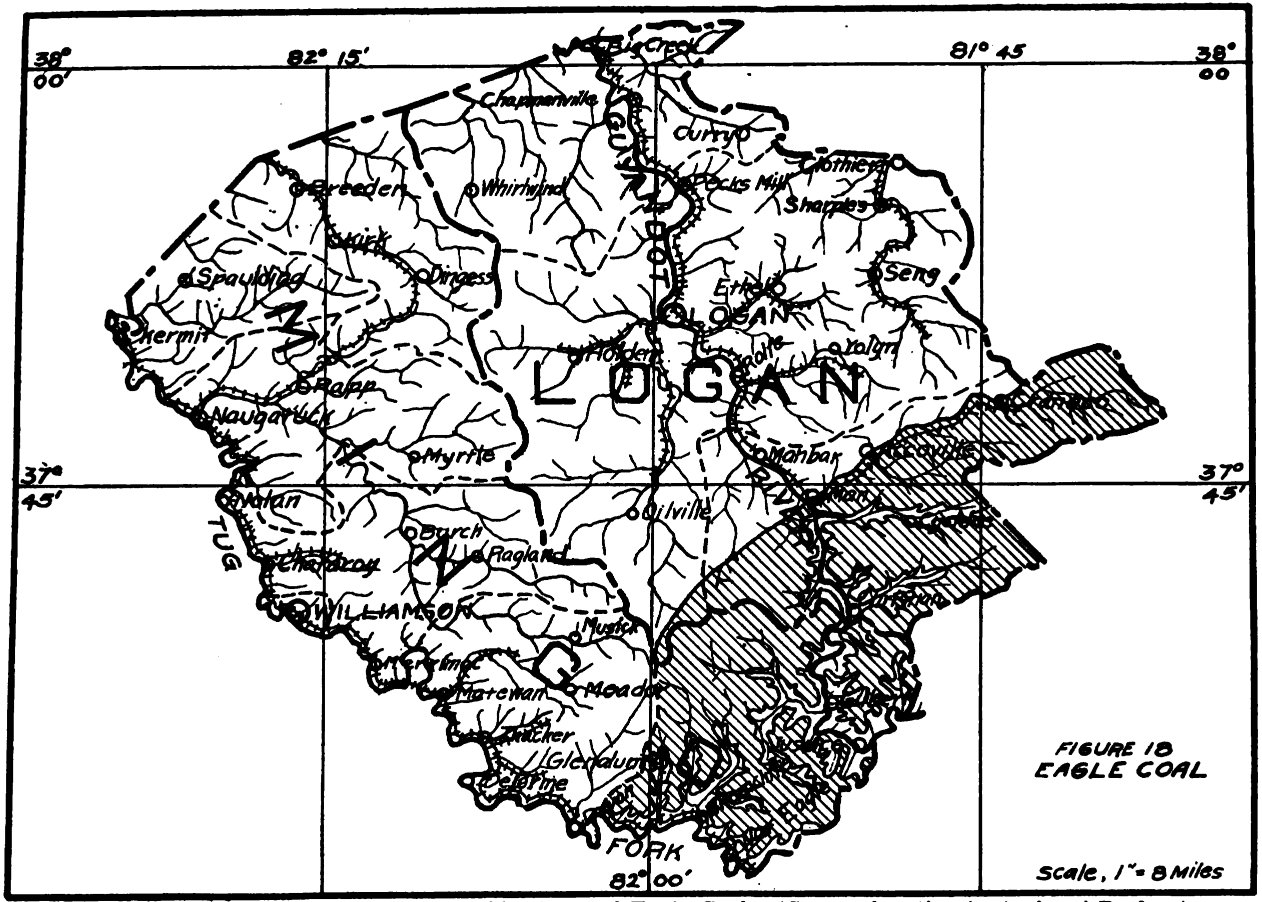

Figure 18. Showing Approximate Minable Area of Eagle Coal. (See explanation in Authors' Preface).

Creek, but no openings of minable thickness were observed. In the Chapmanville Section, published in Chapter IV, the coal is noted 0′ 3″ thick. At Stone Branch, the record of the Miller and Harvey No. 2 Gas Well (No. 11 on Map II), shows a coal 3 feet thick at a depth of 150 feet and about 220 feet below the Campbell Creek (No. 2 Gas) Coal that is possibly the Eagle, but it may be the Little Eagle. In other wells in the same region, the coal is not recorded.

An unsuccessful attempt was once made to open the Eagle Coal on Carney Branch of Guyandot River, 1.6 miles southwest of Godby, but, according to Reger, only 4″ of coal was found at an elevation of 900′ B.

On Crawley Creek, Reger observed what seems to be the Eagle Coal at the mouth of Hurricane Branch, at an elevation of 705′ B., where it is 4 inches thick.

At **Prospect No. 794 on Map II,** at the forks of Crawley, 3.7 miles south of Stollings, the coal was once opened at an elevation of 805′ B., and was fallen shut when visited by Reger, but was reported 1′ 6″ thick.

At **Exposure No. 795 on Map II,** a short distance farther up Crawley, 3.8 miles south of Stollings, the coal has been mined by stripping along the road, according to Reger and Gawthrop, at an elevation of 795′ B., the thickness being concealed.

The evidence available indicates that the Eagle Coal is of little value in Chapmanville District.

Logan District, Logan County.

In Logan District, the Eagle Coal is above drainage along the Guyandot River from the Chapmanville District Line to a point one-half mile below Logan. In Chapter VI, it is noted in the section for Peach Creek, being only 11″ thick at its exposure along the railroad grade at the mouth of Peach Creek.

In the other portions of Logan District, the Eagle Coal horizon is under drainage, and, so far as known, no core tests have pierced it. The record of the Wm. Ellis oil test well (No. 76 on Map II) shows no coal at the Eagle horizon. It is possible that there may be some Eagle Coal in the extreme south-

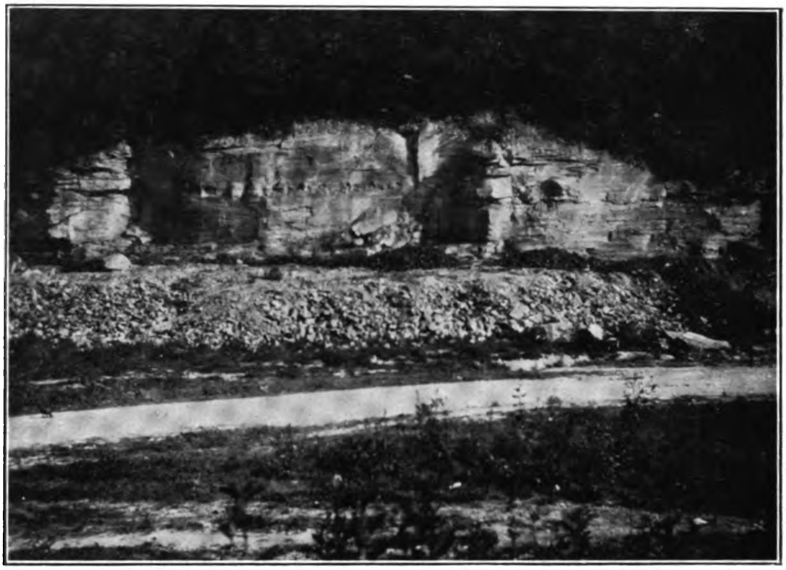

PLATE XV (a)—Quarry in Upper Cedar Grove Sandstone on Copperas Mine Fork, 1¼ miles west of Holden. (See page 169).

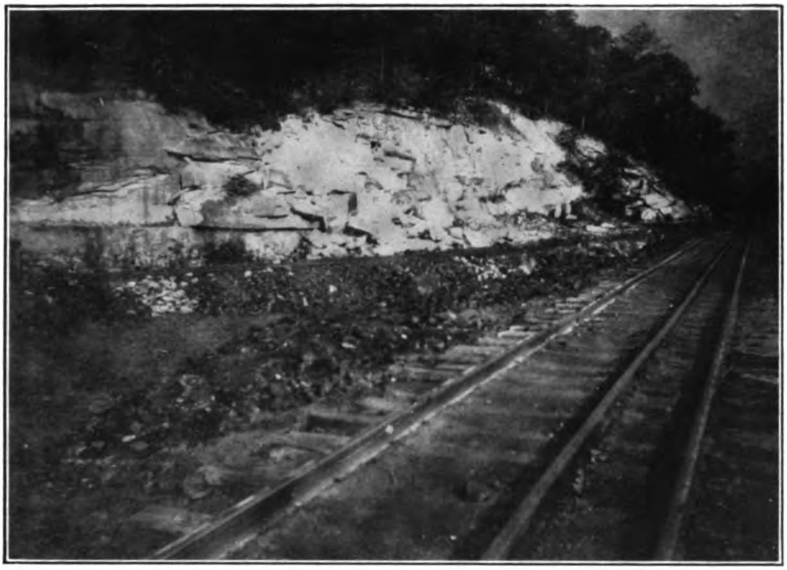

PLATE XV. (b)—Quarry in Logan Sandstone on Whitman Creek, one-eighth mile south of mouth. (See page 179).

ern end of Logan District, but it would probably be a waste of time and money to core test for it there, in view of its poor showing below Logan.

Triadelphia District, Logan County.

In Triadelphia District, the Eagle Coal comes above drainage on the southeastward rise of the rocks about one-half mile below Man on the Guyandot River, and its horizon is exposed above that point along the river, and on Huff and Elk Creeks.

In Chapter IV, the Eagle Coal is noted in the section for Manbar-Man as being 3 feet thick, but slaty, at its exposure at Man Station, at **Exposure No. 796 on Map II,** at an elevation of 731′ L.

The Eagle Coal has been opened frequently along Huff Creek for local use.

The following opening was examined by Hennen:

Coal Opening—No. 797 on Map II.

On Huff Creek, 1 mile southeast of Man; **Eagle Coal**; elevation, 750′ B.

			Feet	Inches
Coal, gas, columnar	0′	7″		
Slate, gray	0	1		
Coal, gas	1	0		
Slate, dark, with streaks of coal	0	4		
Coal, gas	0	5	2	5
Fire clay				

The following exposure was examined by Hennen:

Coal Exposure—No. 798 on Map II.

On Huff Creek, 0.3 mile west of Cyclone; **Eagle Coal**; elevation, 955′ B.

			Feet	Inches
Shale, black			15	0
Coal, gas	1′	10″		
Slate, black	1	7		
Coal, gas	0	6	3	11
Shale, gray, to Bens Creek Coal			18	0

The following exposure was examined by Hennen:

Coal Exposure—No. 799 on Map II.

On Guyandot River, 1 mile south of Man; **Eagle Coal**; elevation, 740′ B.

			Feet	Inches
Shale, black				
Coal, slaty	0′	3″		
Slate, gray	0	3		
Coal, gas	0	2		
Slate, dark	0	2		
Coal, soft	0	8½		
Slate, gray	0	1		
Coal, soft	0	8½		
Shale, gray	1	6		
Coal	0	2		
Shale, gray	0	2		
Coal	0	2	4	4
Shale and sandstone				

Another opening on a creek near by shows the following, according to Hennen:

Coal Opening—No. 800 on Map II.

On Rockhouse Creek, 1.1 miles southwest of Man; **Eagle Coal**; elevation, 745′ B.

			Feet	Inches
Shale, black, laminated			15	0
Coal, bony	0′	6″		
Coal, gas	0	5		
Slate, gray	0	2		
Coal, soft	0	9		
Slate, gray	0	2		
Coal, soft	0	6	2	6
Shale and concealed			5	0
Sandstone, massive, gray and white, Decota				

The two following openings were examined by Hennen:

Coal Opening—No. 801 on Map II.

On Sandlick Branch of Guyandot River, 1.8 miles west of Christian; **Eagle Coal**; elevation, 1025′ B.

			Feet	Inches
Sandstone, flaggy and shaly			20	0
Coal, gas	0′	8″		
Shale, dark gray	0	1½		
Coal, gas	1	5	2	2½
Slate and concealed				

Coal Opening—No. 145 on Map II.

On Sandlick Branch of Guyandot River, 2.2 miles west of Christian; **Eagle Coal**; elevation, 1025′ B.

				Feet	Inches
1.	Sandstone, flaggy			20	0
2.	Coal, gas	0′	9″		
3.	Slate, dark gray, 3″ to	0	4		
4.	Coal, gas	1	7	2	8
5.	Slate				

A sample was collected from Nos. 2 and 4 of section, the composition of which is published under Mine No. 145 in the table at the end of this Chapter. The analysis shows a poor quality of coal, high in both ash and sulphur.

Opening No. 802 on Map II, on Old Fork of Elk Creek, 1.4 miles northeast of Christian, at an elevation of 1015′ B., was fallen shut when visited by Hennen, but was reported 5 feet thick with three partings.

The following opening was examined by Hennen:

Coal Opening—No. 803 on Map II.

On Elk Creek, 4 miles northeast of Christian; **Eagle Coal**; elevation, 1130′ B.

			Feet	Inches
Shale, sandy, buff			5	0
Shale, dark, laminated			5	0
Coal, gas, columnar	2′	5″		
Slate, gray	0	1		
Coal	0	1½		
Slate, gray	0	3		
Coal, gas, columnar	0	10	3	8½
Slate and sandstone, shaly, to bed of Elk Creek			40	0

The following opening was examined by Hennen along the Logan-Mingo County Line:

Coal Opening—No. 804 on Map II.

On Guyandot River, 0.8 mile southwest of Christian; **Eagle Coal**; elevation, 1130′ B.

			Feet	Inches
Shale				
Coal, gas, soft	0′	2″		
Shale	0	9		
Coal, gas, soft	2	2		

			Feet.	Inches.
Shale, dark	0'	1"		
Coal, gas, soft	1	10		
Shale, gray	0	4		
Coal, gas, soft	0	3		
Shale, gray, with coal streaks	0	5		
Coal, gas, soft	2	3	8	3
Slate				

Harvey, Warfield, Hardee, Lee and Williamson Districts, Mingo County.

In **Harvey District,** the Eagle Coal horizon is entirely under drainage. The only available record of a boring that has pierced its horizon is that of the gas well at Dingess (No. 103 on Map II), which shows no coal. Since Harvey District is in the region far west of the typical development of the Eagle seam, it is not likely that coal of minable thickness will be found at this horizon.

In **Warfield District,** the Eagle Coal is under drainage, but numerous gas wells have been drilled through its horizon. Most of these show no Eagle Coal, but in a few of them a coal is found about 150 feet under the Campbell Creek that may represent the Eagle and it has been so correlated in these well records, all of which are published in detail in Chapter VII, except No. 138, which is used in the section for Kermit, published in Chapter IV. The following is a list of the wells which record Eagle Coal in Warfield District:

List of Gas Wells Recording Eagle Coal in Warfield District.

No. on Map.	Name of Well.	Location.	EAGLE COAL. Depth Top.	EAGLE COAL. Thickness Feet.
117	Burning Creek-Marrowbone Land Co. No. 531	Kermit, 3.3 mi. N. E.	280	2
127	James Brewer No. 446	Spaulding, 1.5 mi. S. W.	95	5
129	Anthony Brewer No. 1	Spaulding, 1.7 mi. S. W.	210	3
135	James Vinson No. 101	Kermit, 1.3 mi. N. E.	181	6
138	Hiram Stepp No. 327	Kermit, North edge	175	5

Reference to Map II will show that these wells are scattered throughout the gas field, and reference to Chapter VII, where the detailed gas well records are published, will show that other wells drilled in the same region do not record the Eagle Coal. The conclusion seems evident that these deposits of Eagle Coal are too irregular to make the seam of value in Warfield District.

In **Hardee District**, the Eagle Coal horizon is far under drainage and no borings have pierced it, so that positive evidence is lacking concerning the presence of this coal. It is likely that this district is too far west to hold Eagle Coal of minable thickness and quality.

In **Lee District**, the Eagle Coal horizon is under drainage. The only boring that has pierced it, of which the Survey has a record, is the Buffalo Land Co. Gas Well (No. 160 on Map II), the record of which was used in the Chattaroy Section, published in Chapter IV. There is no coal at the Eagle horizon here and it is doubtful whether coal tests in other parts of Lee District would find the coal in commercial quantity.

In **Williamson District**, the Eagle Coal horizon is under drainage and no borings through it have been made. The failure to find coal in the Buffalo Land Co. well mentioned above, indicates that the presence of the Eagle Coal in this district is extremely doubtful.

Magnolia District, Mingo County.

In Magnolia District, the horizon of the Eagle Coal comes above drainage along Tug Fork at Matewan and remains exposed all the way up to the Stafford District Line. In Chapter VI, it is recorded in the sections for Rose Siding and Delorme, in both of which it is only a blossom. The bloom of this coal may be found at numerous points along its outcrop, but coal of commercial thickness was not observed. At **Prospect No. 805 on Map II,** on Foundation Fork of Beech Creek, 1.5 miles southwest of Hinch, at an elevation of 1140′ B., the coal was reported 1′ 8″ thick, but the prospect had fallen shut when visited by Gawthrop, and this thickness could not be verified.

Stafford District, Mingo County.

In Stafford District, the Eagle Coal attains its best development in the two counties. It is above drainage along the principal streams and had been mined commercially, being known locally as "**Middle War Eagle.**"

In Chapter IV, the Eagle Coal is noted in the section for War Eagle, where it is 8′ 2½″ thick, with partings.

Numerous openings have been made along the waters of Guyandot River in the northern part of the district. The following opening was examined by Gawthrop:

Coal Opening—No. 806 on Map II.

On Sylvia Branch of Guyandot River, 1.6 miles southwest of Christian; **Eagle (Middle War Eagle) Coal**; elevation, 1105′ B.

			Feet	Inches
Sandstone, shaly			3	0
Coal, gas	0′	11″		
Slate, black	0	0½		
Coal, semi-splint	1	0		
Coal, gas	0	10	2	9½
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 807 on Map II.

On Spice Creek, 2.2 miles southeast of Christian; **Eagle (Middle War Eagle) Coal**; elevation, 1250′ B.

			Feet	Inches
Shale, dark gray, sandy			10	0
Coal, gas	0′	4½″		
Shale, gray	0	3½		
Coal, gas	0	1		
Shale	0	0½		
Coal, hard	0	5		
Coal, gas	0	7		
Coal, splinty	0	8		
Coal, gas	1	5	3	10½
Slate				

Opening No. 808 on Map II, at the mouth of Browning Fork of Horsepen Creek, 1.5 miles northwest of Horsepen, at an elevation of 1080′ B., was fallen shut when visited by Hennen, but the coal was reported 5 feet thick with two partings 8″ and 4″ thick.

The following exposure was examined by Hennen:

Coal Exposure—No. 809 on Map II.

On Browning Fork of Horsepen Creek, 2.3 miles N. 15° W. of Horsepen; **Eagle (Middle War Eagle) Coal**; elevation, 1010′ B.

			Feet	Inches
Sandstone, massive, Eagle			20	0
Shale, black			10	0
Coal, slaty	0′	2″		
Slate	0	1		
Coal, soft	0	5		
Shale, gray	2	0		
Coal, soft	0	4		
Shale, gray	1	3		
Coal	0	11		
Slate, black	0	10		
Coal, slaty	0	4	6	4
Slate				

The following exposure was examined by Hennen and Gawthrop in the bed of Horsepen Creek:

Coal Exposure—No. 810 on Map II.

On Horsepen Creek, 2.2 miles northwest of Gilbert; **Eagle (Middle War Eagle) Coal**; elevation, 995′ B.

			Feet	Inches
Sandstone, flaggy and shaly			5	0
Shale, sandy			2	0
Coal	0′	2″		
Shale, gray	2	0		
Coal	0	2		
Slate, gray	0	1		
Coal	0	2	2	7
Sandstone, to bed of creek			0	4

The following opening was examined by Hennen and Gawthrop:

United Thacker Coal Co. Opening—No. 146 on Map II.

On a branch of Horsepen Creek, near Twisted Gun Gap, 3.3 miles S. 75° W. of Gilbert; **Eagle (Middle War Eagle) Coal**; elevation, 1185′ B.

				Feet	Inches
1.	Sandstone, massive			5	0
2.	Shale, gray, sandy			3	0
3.	Coal, gas, columnar, with slate partings ⅛″ thick almost every 2″ to 5″	2′	3″		
4.	Shale, gray	0	4½		
5.	Coal, gas	0	1½		
6.	Shale, gray	0	3		
7.	Coal	0	3¼		
8.	Slate, black	0	0¼		
9.	Coal	0	3		
10.	Slate, black	0	0½		
11.	Coal, gas, columnar	1	4	4	11
12.	Slate				

A sample was collected from Nos. 3, 5, 7, 9 and 11 of section, the composition of which is published under Mine No. 146 in the table at the end of this Chapter. The analysis shows a fair grade of coal, not so good as the more important seams of the Kanawha Series, but better than those of northern West Virginia.

The following opening was examined by Gawthrop east of the Guyandot River:

Alexander Stafford Opening—No. 147 on Map II.

On Stafford Branch of Guyandot River, 1 mile southeast of Gilbert; **Eagle (Middle War Eagle) Coal**; elevation, 1345′ B.

				Feet	Inches
1.	Shale, sandy			5	0
2.	Coal, gas	3′	0″		
3.	Slate, dark	0	4		
4.	Coal	0	2		
5.	Slate, dark	0	4		
6.	Coal, medium hard	1	0	4	10
7.	Slate				

A sample was collected from Nos. 2 and 4 of section, the composition of which is published under Mine No. 147 in the table at the end of this Chapter. The analysis shows a good quality of coal.

The two following openings were examined by Gawthrop:

Coal Opening—No. 811 on Map II.

On Neds Branch of Guyandot River, 1.4 miles southwest of Justice; **Eagle (Middle War Eagle) Coal**; elevation, 1415′ B.

			Feet	Inches
Sandstone, flaggy			3	0
Shale, gray			2	0
Coal, columnar	2′	2″		
Slate, black	0	1		
Coal	0	4		
Slate	0	0½		
Coal, visible	0	5½	3	1
Concealed				

Coal Opening—No. 812 on Map II.

On Neds Branch of Guyandot River, 1.8 miles southwest of Justice; **Eagle (Middle War Eagle) Coal**; elevation, 1410′ B.

			Feet	Inches
Sandstone, massive			6	0
Coal, soft, columnar	2′	2″		
Slate, black	0	0½		
Coal, soft, columnar	0	4		
Slate, black	0	0½		
Coal, soft, columnar	0	9		
Shale, reported	3	0		
Coal, reported	2	0	8	4
Slate				

The following opening was examined by Gawthrop:

Coal Opening—No. 813 on Map II.

On Guyandot River, 0.6 mile northwest of Justice; **Eagle Coal**; elevation, 1455′ B.

			Feet	Inches
Sandstone, shaly			5	0
Shale, gray			1	0
Coal, gas, columnar	2′	10″		
Shale, reported	1	10		
Coal, reported	2	1	6	9

The following opening was examined by Gawthrop:

Coal Opening—No. 814 on Map II.

On a branch of Leatherwood Creek, 2.7 miles northeast of Justice; **Eagle Coal**; elevation, 1360′ B.

			Feet	Inches
Shale, gray			10	0
Coal, gas, columnar	1′	1″		
Slate, black	0	0½		
Coal	0	3		
Slate, black	0	1		
Coal, gas, harder	1	2	2	7½
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 815 on Map II.

On a branch of Leatherwood Creek, 3.3 miles northeast of Justice; **Eagle (Middle War Eagle) Coal**; elevation, 1430′ B.

			Feet	Inches
Shale, gray				
Coal, soft, columnar	2′	0″		
Shale	0	0½		
Coal, gas, harder	0	10½	2	11
Slate				

The Eagle Coal has been mined commercially in the southern part of Stafford District, along Turkey Creek. The following mine in this coal was examined and sampled by Hennen and the results published in Volume II(A), page 328, of the State Survey Reports, the coal being classified under the local title of **"Middle War Eagle"**:

Margaret Mining Co., Margaret Mine No. 1—
No. 148 on Map II.

On Turkey Creek, 1.6 miles N. 60° E. of War Eagle; **Eagle (Middle War Eagle) Coal**; elevation, 1404′ L.

			Feet	Inches
1. Sandstone, good roof				
2. Draw slate, 2′ 6″ to			3	0
3. Coal, gas, medium hard	1′	3½″		
4. Slate, gray	0	0½		
5. Coal, gas	1	0½		
6. Slate, gray	0	0½		
7. Coal	2	9	5	2

"Greatest rise, southeast; faces, irregular; capacity of mine, 500 tons; men employed 75; shipped east and west, mostly for steam, some for domestic use; authority for mine data, A. H. Dangerfield, Superintendent; principal office of Company, Welch, McDowell County; sample from Nos. 3, 5 and 7 for analysis."

The composition of this sample is published under Mine No. 148 in the table at the end of this Chapter.

The following mine in the Eagle Coal was examined and sampled by Hennen and the results published in Volume II(A), page 327, of the State Survey Reports, the coal being classified under the local name of **"Middle War Eagle"**:

War Eagle Coal Co., Mephisto Mine—No. 149 on Map II.

On Turkey Creek, 1.7 miles N. 62° E. of War Eagle; **Eagle (Middle War Eagle) Coal**; elevation, 1431' L.

				Feet	Inches
1.	Sandstone, roof good				
2.	Coal, gas, medium hard	2'	2"		
3.	Slate, gray, 0' 4" to	0	5		
4.	Coal, gas, medium hard	3	5		
5.	Slate	0	6		
6.	Coal, gas	0	4	6	10

"Principal office War Eagle; greatest rise, southeast; capacity of mine, 150 tons; men employed, 40; shipped east and west mostly for steam; authority for mine data, Geo. W. Coffey, Superintendent; sample from Nos. 2 and 4 for analysis."

The composition of this sample is published under Mine No. 149 in the table at the end of this Chapter.

The following mine in the Eagle Coal was examined and sampled by Hennen and the results published in Volume II(A), page 327, of the State Survey Reports, the coal being classified under the local name of **"Middle War Eagle"**:

War Eagle Coal Co., Pappoose Mine—No. 150 on Map II.

On Turkey Creek, 1.5 miles N. 75° W. of War Eagle; **Eagle (Middle War Eagle) Coal**; elevation, 1430' B.

				Feet	Inches
1.	Coal, "Upper War Eagle," Campbell Creek (No. 2 Gas)			5	10
2.	Concealed and sandstone			215	0
3.	Draw slate, 0" to			0	10
4.	Coal, gas, medium hard	0'	3"		
5.	Bone, 0" to	0	1		
6.	Coal, gas, medium hard	2	5		
7.	Slate, gray, 0½" to	0	3		

				Feet.	Inches.
8.	Coal, gas, medium hard....	3′	2½″		
9.	Slate, gray	0	6		
10.	Coal, gas	0	4	 7	0½
11.	Sandstone and concealed			250	0
12.	Coal, gas, soft, good (Lower War Eagle)..			2	4

"Principal office, War Eagle; greatest rise, southeast; capacity of mine, 300 tons; men employed, 70; shipped both east and west for steam, and some for domestic use; sample from Nos. 4, 6 and 8 for analysis."

The composition of this sample is published under Mine No. 150 in the table at the end of this Chapter.

Quantity of Eagle Coal Available.

Based on the evidence of the preceding pages and on a planimetric determination of the area by Gawthrop, the following estimate is made for those districts which are known or believed to contain the Eagle Coal in minable quantity:

Probable Amount of Eagle ("Middle War Eagle") Coal.

Counties by Districts	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Triadelphia (for portion shown on Figure 18)...	2	78.00	49,920	4,349,030,400	173,961,216
Mingo:					
Stafford	2	64.00	40,960	3,568,435,200	142,737,408
Totals for Both Counties		142.00	90,880	7 917,465,600	316,698,624

THE BENS CREEK COAL.

The Bens Creek Coal, which has been described briefly in Chapter VI, pages 205-6, is only of minor importance compared to the other minable coals of the Kanawha Series, being of little value anywhere in the territory of this Report, except in Stafford District, Mingo County, where it is a fairly good coal.

The outcrop of the coal is not shown on Map II, but its position may be determined closely from that of the Eagle, which overlies the Bens Creek by only 30 to 40 feet in Stafford District, where both are found. Figure 19 shows the region where it may be of possible commercial value.

Chapmanville and Logan Districts, Logan County.

In Chapmanville and Logan Districts, the Bens Creek Coal horizon is above drainage along Guyandot River from Chapmanville to Peach Creek, but the coal was not noted. In such deep wells as have been drilled in these two districts, no coal is reported to have been found at this horizon, making the conclusion evident that it is not present in minable quantity.

Triadelphia District, Logan County.

In Triadephia District, the Bens Creek Coal was noted by Hennen one-half mile west of Cyclone on Huff Creek, where it is 1′ 1″ thick, separated from the Eagle Coal (at Opening No. 798 on Map II) by 18 feet of shale.

The following opening was examined by Hennen:

Coal Opening—No. 816 on Map II.

On Moore Fork of Elk Creek, 1.8 miles southeast of Christian; Bens Creek Coal; elevation, 1145′ B.

	Feet	Inches
Shale, dark	9	0
Coal, gas, soft	2	4
Slate		

Harvey, Warfield, Hardee, Lee and Williamson Districts, Mingo County.

In the five western districts of Mingo County, the Bens Creek Coal is completely under drainage, but the fact that numerous gas wells in Warfield, one in Harvey, and one in Lee

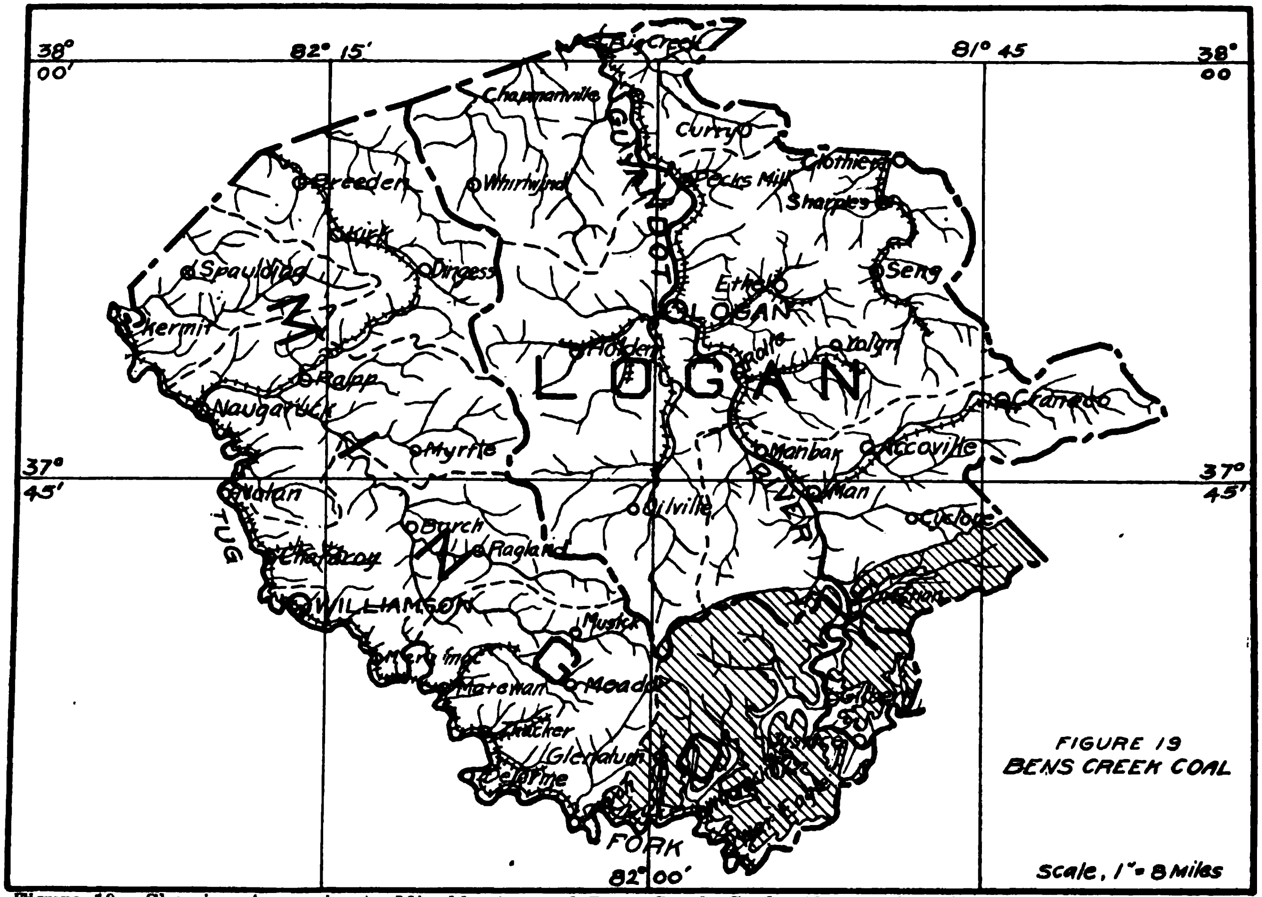

Figure 19. Showing Approximate Minable Area of Bens Creek Coal. (See explanation in Authors' Preface.)

Districts, were drilled through the horizon without finding the coal, coupled with the fact that it is known to be worthless in the region of its first outcrop east of these districts, is sufficient evidence to support the statement that the Bens Creek Coal will not likely be found in minable quantity in these five districts.

Magnolia District, Mingo County.

In Magnolia District, the Bens Creek Coal rises above drainage along Tug Fork, a short distance east of Matewan, but was not found to be of commercial value.

The following exposure was examined by Gawthrop:

Coal Exposure—No. 817 on Map II.

On Righthand Fork of Beech Creek, 2 miles north of Lindsey; **Bens Creek Coal**; elevation, 1040′ B.

	Feet	Inches
Sandstone, massive, Bens Creek	10	0
Coal, gas, columnar	1	6
Shale		

Stafford District, Mingo County.

In Stafford District, the Bens Creek Coal is of commercial local importance, being opened for domestic use at numerous places in the region of its outcrop. In the section for War Eagle, published in Chapter IV, the coal is noted 2′ 9″ thick.

The coal is best exposed along Bens Creek, where several openings have been made. The following was examined by Gawthrop:

Coal Opening—No. 818 on Map II.

On Left Fork of Bens Creek, at Beech Creek Post-Office; **Bens Creek Coal**; elevation, 1140′ B.

	Feet	Inches
Sandstone, massive, Bens Creek	10	0
Shale, gray	5	0
Coal, gas, reported	2	10
Shale		

The following opening was examined by Gawthrop:

Coal Opening—No. 819 on Map II.

On Left Fork of Bens Creek, 0.3 mile north of Beech Creek; **Bens Creek Coal**; elevation, 1130′ B.

	Feet	Inches
Sandstone, massive, Bens Creek	5	0
Shale	1	0
Coal, gas	2	4
Shale	1	0

At **Opening No. 820 on Map II,** on Left Fork of Bens Creek, 0.9 mile northeast of Beech Creek, the coal was noted by Hennen and Gawthrop as being 2′ 3″ without partings, at an elevation of 1135′ B.

Coal Opening—No. 821 on Map II.

On Left Fork of Bens Creek, 1 mile north of Beech Creek; **Bens Creek Coal**; elevation, 1130′ B.

	Feet	Inches
Sandstone, massive, coarse, Bens Creek	40	0
Coal, gas, columnar	2	3
Slate and concealed to creek	15	0

The following opening was examined by Hennen and Gawthrop:

Coal Opening—No. 822 on Map II.

On Left Fork of Bens Creek, 1.1 miles north of Beech Creek; **Bens Creek Coal**; elevation, 1115′ B.

	Feet	Inches
Sandstone, massive, Bens Creek	40	0
Shale, sandy, dark	1	0
Coal, gas, columnar	2	2
Concealed to creek	3	0

The following opening was examined by Gawthrop:

Coal Opening—No. 823 on Map II.

On Bens Creek, 1.4 miles north of Wharncliffe; **Bens Creek Coal**; elevation, 1185′ B.

			Feet	Inches
Shale, gray, sandy			10	0
Coal, gas	0′	3″		
Shale	0	2		
Coal, gas	2	5	2	10
Slate				

At **Opening No. 824 on Map II**, on Bens Creek, 3.3 miles northeast of Wharncliffe, Gawthrop observed 2′ 2″ of soft gas coal, at an elevation of 1210′ B.

Gawthrop collected a sample of the coal from this opening for analysis and it yielded the following results, according to Messrs. Hite and Krak:

	Per cent.
Moisture	0.84
Volatile Matter	36.68
Fixed Carbon	55.72
Ash	6.76
Total	100.00
Sulphur	3.30
Phosphorus	0.006

The following opening was examined by Hennen and Gawthrop:

Coal Opening—No. 825 on Map II.

On Bens Creek, 1.9 miles northeast of Beech Creek; **Bens Creek Coal**; elevation, 1130′ B.

	Feet	Inches
Shale, sandy	4	0
Coal, soft, columnar	2	5
Shale		

The following opening was examined by Hennen and Gawthrop:

Coal Opening—No. 826 on May II.

On Bens Creek, 0.6 mile southwest of Twisted Gun Gap; **Bens Creek Coal**; elevation, 1125′ B.

	Feet	Inches
Shale		
Coal, soft, columnar	2	4
Shale		

The following opening was examined by Gawthrop:

Coal Opening—No. 827 on Map II.

On Bens Creek, 0.7 mile southwest of Twisted Gun Gap; **Bens Creek Coal**; elevation, 1120′ B.

	Feet	Inches
Shale, dark gray	10	0
Coal, gas, columnar, **Bens Creek**	2	5
Shale and concealed	10	0
Shale	10	0
Coal, gas	0	4
Concealed to bed of Bens Creek	10	0

Some openings have been made along the waters of Guyandot River in the northern part of Stafford District.

At **Opening No. 828 on Map II,** on Horsepen Creek, 2 miles northwest of Horsepen, the coal was once opened at an elevation of 1025′ B. The opening was fallen shut when visited by Gawthrop, but the coal was reported one foot thick.

The following opening was examined by Hennen:

Coal Opening—No. 829 on Map II.

On Steer Hollow of Gilbert Creek, 3.2 miles southwest of Justice; **Bens Creek Coal**; elevation, 1400′ B.

	Feet	Inches
Fire clay, concealed, and slate from Eagle Coal (hand level measure)	23	6
Coal, soft, gas, columnar	2	6
Slate		

Quantity of Bens Creek Coal Available.

Based on the evidence of the preceding pages and on an areal determination by Gawthrop, the following estimate is made of the probable amount of Bens Creek Coal:

Probable Amount of Bens Creek Coal.

Counties By Districts	Thickness of Coal. Assumed. Feet.	Square Miles	Acres	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Triadelphia (southern edge only)..	2	19.00	12,160	1,059,379,200	42,375,168
Mingo:					
Stafford	2	66.50	42,560	3,707,827,200	148,313,088
Totals for Both Counties		85.50	54,720	4,767 206,400	190,688,256

THE CEDAR COAL.

The Cedar Coal, which has been named and briefly described in Chapter VI, is of minor importance, being found principally in Magnolia and Stafford Districts, Mingo County. While the horizon of this coal is under drainage in a large part of the two counties, it was pierced by several tests for oil and gas without finding any coal worthy of note. Its outcrop is not shown on Map II, but it belongs about midway between the Eagle and Lower War Eagle Coals, the outcrops of which are shown on Map II. Figure 20 shows the region where it is known or believed to be commercially valuable.

Magnolia District, Mingo County.

In Magnolia District, the Cedar Coal rises above drainage along Tug Fork just below Thacker and is kept above the river by the southeastward rise of the rocks all to the way to the McDowell County Line.

In Chapter IV, it is noted in the section for Cedar where it is 3′ 8″ thick, and in Chapter VI, it is recorded in those for Thacker, Grapevine, Delorme, and Devon.

The following exposure was examined by Hennen:

Coal Exposure—No. 830 on Map II.

On Tug Fork, 0.7 mile southeast of Thacker; Cedar Coal; elevation, 748′ L.

	Feet	Inches
Coal	2	4
Sandstone, massive, to railroad grade	30	0

The following mine in the Cedar Coal was examined and sampled by Hennen and the results published in Volume II(A), page 332, of the State Survey Reports, the coal being erroneously classified as **"Upper War Eagle"**:

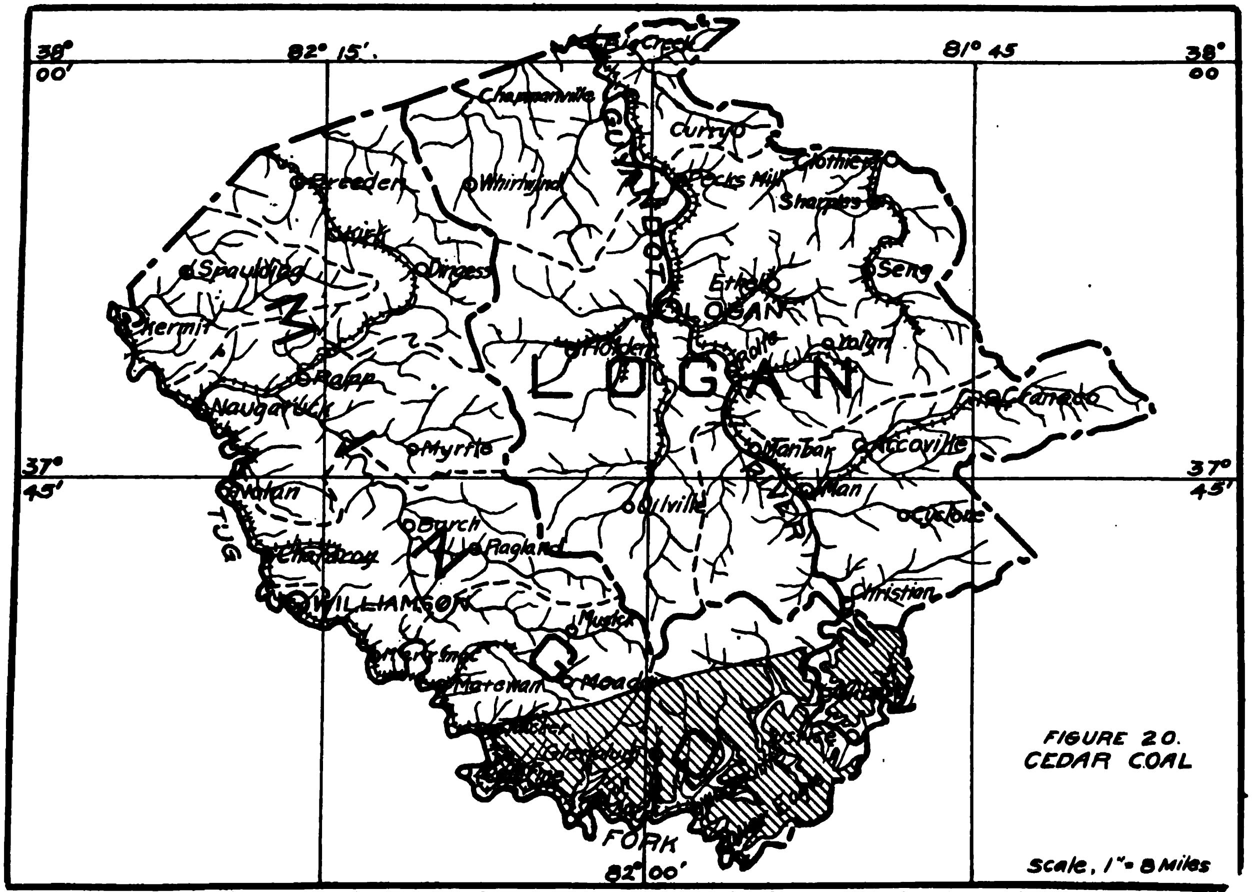

Figure 20. Showing Approximate Minable Area of Cedar Coal. (See explanation in Authors' Preface.)

Majestic Colliery Co. Mine. (Abandoned)— No. 151 on Map II.

On Tug Fork at Cedar; **Cedar Coal**; elevation, 895′ B.

				Feet	Inches
1.	Draw slate, some coal in it			0	6
2.	Coal, gas, medium hard	0′	11½″		
3.	"Mother" coal	0	0¼		
4.	Coal, gas	1	11	2	10¾

"Greatest rise, southeast; faces, irregular; mine capacity, 200 tons; men employed, 15; 'run-of-mine' shipped mostly east for steam; principal office, Eckman; authority for mine data, A. B. Rawn, Superintendent; sample from Nos. 2, 3 and 4 for analysis."

The composition of this sample is published under Mine No. 151 in the table at the end of this Chapter.

The coal is of only fair purity, compared to the Campbell Creek (No. 2 Gas) Coal and other good seams above it.

The following opening was examined by Gawthrop:

Coal Opening—No. 831 on Map II.

On Beech Creek, 2.5 miles N. 15° E. of Devon; **Cedar Coal**; elevation, 925′ B.

			Feet	Inches
Sandstone massive			5	0
Shale, dark, gray			5	0
Coal, gas	0′	6″		
Shale, gray	0	10		
Coal	0	1		
Shale	0	1		
Coal	0	8		
Shale	0	4		
Coal, visible	0	3	2	9
Concealed				

Stafford District, Mingo County.

In Stafford District, a few openings have been made in the Cedar Coal, but the evidence regarding it is scanty.

At **Exposure No. 832 on Map II,** on Bens Creek, at Twisted Gun Gap, Hennen and Gawthrop observed 1′ 6″ of coal at an elevation of 1065′ B.

At **Prospect No. 833 on Map II,** on Browning Fork of Horsepen Creek, 1.6 miles northwest of Horsepen, at an elevation of 950′ B., the opening was fallen shut when visited by Hennen, but the coal was reported 6″ thick by E. Ferrell.

The following prospect, which was fallen shut when visited by Gawthrop, appears to represent the Cedar Coal. The section, as furnished by a resident, is as follows:

Coal Opening—No. 834 on Map II.

On Harry Branch of Guyandot River, 1.5 miles northeast of Gilbert; **Cedar Coal**; elevation, 1180′ B.

			Feet	Inches
Coal	0′	8″		
Shale	2	0		
Coal	0	8	3	4

At **Opening No. 835 on Map II,** on Guyandot River, 0.6 mile northwest of Justice, at an elevation of 1325′ B., the coal was not exposed when visited by Gawthrop, but was reported 3′ 10″ thick.

Quantity of Cedar Coal Available.

Based on the evidence of the preceding pages, and on an areal determination by Gawthrop, the following estimate is made of the probable amount of Cedar Coal, for the region shown on Figure 20:

Probable Amount of Cedar Coal.

Districts (Mingo County).)	Thickness of Coal. Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Magnolia (Southeastern portion)	2	17.00	10,880	947,865,600	37,914,624
Stafford (southern portion)	2	50.00	32,000	2,787,840,000	111,513,600
Totals		67.00	42,880	3,735,705,600	149,428,224

THE LOWER WAR EAGLE COAL.

The Lower War Eagle Coal, which has been described briefly in Chapter VI, is of secondary importance when compared to many of the great coal seams of the Kanawha Series. It is known to be of value only in the southeastern end of the territory of this Report. As shown by its outcrop of Map II, it is below drainage in a large part of the two counties, but the wells drilled for oil and gas in this region indicate that it will not be found there in minable quantity. Figure 21 shows the region where it is known or believed to be of minable thickness and quality.

Chapmanville and Logan Districts, Logan County.

In Chapmanville and Logan Districts, the Lower War Eagle Coal horizon is above drainage along Guyandot River between Conley Branch and Snap Branch and a coal blossom was frequently found which was thought to represent it and which was used as a guide for indicating its outcrop on Map II. Deep well drillings in other portions of the two districts do not show Lower War Eagle Coal.

An exposure in this coal was examined by Hennen in the eastern end of Chapmanville District, where the following evidence was secured:

Coal Exposure—No. 836 on Map II.

On Big Creek, 0.5 mile northeast of Curry; **Lower War Eagle Coal**; elevation, 835′ B.

	Feet	Inches
Shale, dark, sandy	25	0
Coal in bed of creek	1	0
Concealed		

This exposure is about 40 feet below the outcrop of the Eagle Limestone which is exposed along Curry Fork one-half mile northeastward, this interval being only about one-half as great here as in the region of War Eagle, Mingo County.

On Crawley Creek, the Lower War Eagle Coal is exposed

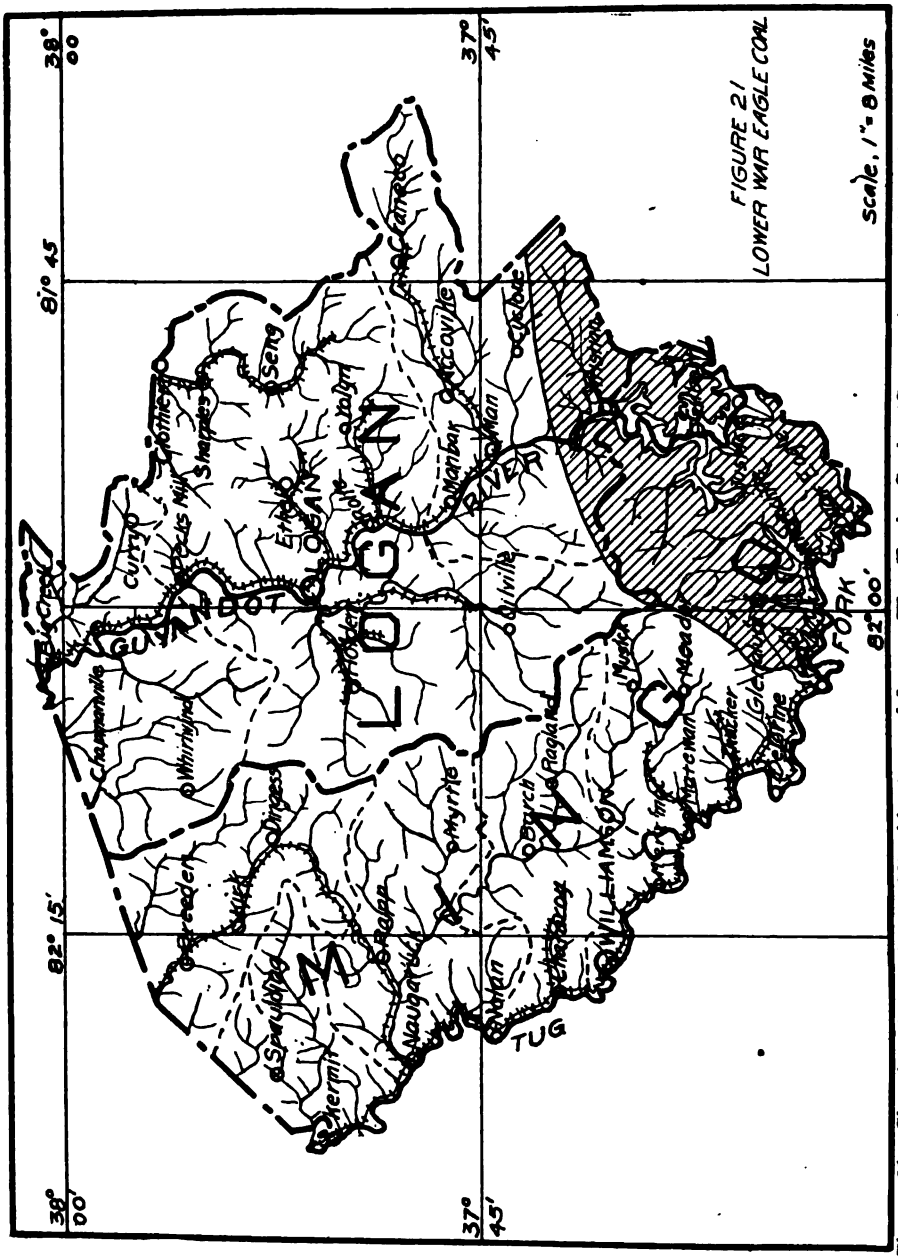

Figure 21. Showing Approximate Minable Area of Lower War Eagle Coal. (See explanation in Authors' Preface).

about one foot thick, just above drainage, at an elevation of 730′ B., where the Warfield Anticline crosses the creek, and also at another point about one-half mile northwest of the arch, at an elevation of 695′ B.

Along Mill Creek, which empties into the Guyandot River at Mill Creek, the Lower War Eagle Coal has been prospected for local use, but most of the openings visited were fallen shut. The following was examined by Hennen:

Coal Opening—No. 836A on Map II.

On Mill Creek, 1.3 miles northeast of Pecks Mill; **Lower War Eagle Coal**; elevation, 780′ B.

	Feet	Inches
Shale and sandstone	4	0
Coal, reported	3	6
Shale	5	0
Sandstone, massive, coarse, gray and white	50	0

The coal was once mined here for local use.

Triadelphia District, Logan County.

In the northern part of Triadelphia District, the Lower War Eagle Coal seems too thin to be of value, but along the southern edge, the two following openings were observed by Hennen:

Coal Opening—No. 152 on Map II.

On Guyandot River, 0.7 mile northwest of Christian; **Lower War Eagle Coal**; elevation, 810′ B.

	Feet	Inches
1. Shale, dark, laminated	7	0
2. **Coal, gas**	3	2
3. Slate	1	0
4. Sandstone		

No partings were visible in the opening, but residents reported to Hennen that the seam was lenticular, sometimes thinning out entirely. A sample was collected from No. 2 of section, the composition of which is published under Mine No. 152 in the table at the end of this Chapter. The analysis shows good coal, low in ash, sulphur and phosphorus.

Coal Opening—No. 837 on Map II.

On Elk Creek, 1 mile east of Christian; **Lower War Eagle Coal**; elevation, 880′ B.

	Feet	Inches
Sandstone, massive	5	0
Shale, buff	1	3
Coal, gas	3	6
Slate		

At **Opening No. 837A on Map II,** on Elk Creek, 1.3 miles northeast of Christian, Hennen observed 2′ 5″ of clean coal, at an elevation of 900′ B.

The following opening was examined by Hennen:

Coal Opening—No. 838 on Map II.

On Moore Fork of Elk Creek, 1.7 miles east of Christian; **Lower War Eagle Coal**; elevation, 910′ B.

			Feet	Inches
Sandstone, dark, sandy			10	0
Coal, gas, soft, columnar	0′	9″		
Slate, dark, hard	0	2		
Bone	0	7		
Coal, gas, soft, columnar	0	9		
Bone	0	1		
Slate, dark	0	2		
Coal, gas	0	6	3	0
Slate				

Harvey, Warfield, Hardee, Lee and Williamson Districts, Mingo County.

In the five western districts of Mingo County, the Lower War Eagle Coal does not appear above drainage, but several deep wells have been drilled through its horizon without finding the coal; hence, with this evidence along with the fact that the coal is of little importance where it first rises above drainage along Tug Fork east of the Lee District Line, it seems safe to conclude that little coal of minable quality will be found in these districts at the Lower War Eagle horizon.

Magnolia District, Mingo County.

In Magnolia District, the Lower War Eagle Coal rises above drainage just above Delorme, and remains above Tug Fork all the way to the McDowell County Line. The coal was observed at several points along its outcrop, but was seldom found in minable thickness. In Chapter IV, it is recorded in the section for Cedar as being 1′ 6″ thick.

The following exposure was examined by Hennen:

Coal Exposure—No. 839 on Map II.

On Tug Fork, at Cedar; **Lower War Eagle Coal**; elevation, 780′ B.

			Feet	Inches
Sandstone, shaly			10	0
Shale, buff, sandy			10	0
Slate, black, hard, laminated and blocky			3	0
Coal, gas	0′	2½″		
Slate, gray	0	0¼		
Coal, gas	1	7½	1	10¼
Slate and concealed			3	0
Sandstone, massive, Upper Gilbert, to railroad grade			35	0

The following opening was examined by Gawthrop:

Coal Opening—No. 153 on Map II.

On Beech Creek, 0.6 mile north of Devon; **Lower War Eagle Coal**; elevation, 840′ B

				Feet	Inches
1.	Sandstone				
2.	Coal, gas	0′	2″		
3.	Slate	0	0½		
4.	Coal	0	1		
5.	Slate	0	1		
6.	Coal, gas, medium hard	2	5	2	9½
7.	Slate				

A sample was collected from No. 6 of section, the composition of which is published under Mine No. 153 in the table at the end of this Chapter. The analysis shows a good quality of coal, low in ash, sulphur and phosphorus.

Stafford District, Mingo County.

In Stafford District, the Lower War Eagle Coal attains its best development within the two counties. In the section for War Eagle, published in Chapter IV, it is recorded 3′ 9″ thick. The coal has not been mined commercially.

Some openings have been made along Bens Creek. The following was examined by Gawthrop:

Coal Opening—No. 840 on Map II.

On Left Fork of Bens Creek, 1.4 miles northwest of Wharncliffe; **Lower War Eagle Coal**; elevation, 945′ B.

	Feet	Inches
Shale, gray	10	0
Coal, gas	2	7
Shale and concealed	8	0
Sandstone, massive, to creek	10	0

The following opening was examined by Gawthrop:

Coal Opening—No. 841 on Map II.,

On Bens Creek, 1.2 miles north of Wharncliffe; **Lower War Eagle Coal**; elevation, 985′ B.

	Feet	Inches
Shale, gray	10	0
Coal, visible	1	10
Concealed		

The following opening was examined by Hennen:

Coal Opening—No. 842 on Map II.

On Righthand Fork of Bens Creek, 2 miles northeast of Wharncliffe; **Lower War Eagle Coal**; elevation, 1125′ B.

			Feet	Inches
Sandstone, flaggy			5	0
Coal, gas	0′	9″		
Slate, dark, gray, hard, 0½″ to	0	2		
Coal, gas	1	2	2	1
Slate, sandstone and shale			5	0
Coal, slaty			0	4
Fire clay shale			3	0

The following opening was examined by Gawthrop:

Coal Opening—No. 843 on Map II.

On Bens Creek, 1.6 miles N. 10° E. of Wharncliffe; **Lower War Eagle Coal**; elevation, 980′ B.

			Feet	Inches
Sandstone, massive			10	0
Coal, gas	1′	11″		
Shale, 6″ to	1	0		
Coal, (reported), not seen	0	5	3	4

The following opening was examined by Gawthrop:

Coal Opening—No. 844 on Map II.

On Bens Creek, 1.8 miles northeast of Wharncliffe; **Lower War Eagle Coal**; elevation. 980′ B.

	Feet	Inches
Sandstone, massive	15	0
Coal, gas, soft	1	7
Slate		

The following opening was examined by Gawthrop:

Coal Opening—No. 845 on Map II.

On Bens Creek, 2.4 miles northeast of Wharncliffe; **Lower War Eagle Coal**; elevation, 1000′ B.

			Feet	Inches
Sandstone			3	0
Shale, dark gray, sandy			5	0
Coal, gas, soft	0′	4″		
Shale, gray	1	4		
Coal	0	1		
Shale	0	2		
Coal, gas	0	8		
Coal, semi-splint	0	3		
Coal, gas	0	11	3	9

The following opening was examined by Gawthrop:

Coal Opening—No. 846 on Map II.

On Bear Fork of Bens Creek, 2.9 miles northeast of Wharncliffe; **Lower War Eagle Coal**; elevation, 1000′ B.

			Feet	Inches
Shale, gray, sandy			10	0
Slate, black, flaggy			2	6
Coal, gas	0′	6″		
Shale, gray	0	10		
Coal, visible	1	3	2	7
Concealed				

The Lower War Eagle Coal was once opened at **Prospect No. 847 on Map II,** on Star Fork of Turkey Creek, 1.1 miles northeast of War Eagle, at an elevation of 1165′ B., but the opening was fallen shut when visited by Hennen and Gawthrop, the coal, however, being reported 2 feet thick.

At **Opening No. 848 on Map II,** on Turkey Creek, 1.6 miles northeast of War Eagle, the coal was found to be 3′ 9″ thick, as published in the section for War Eagle on Chapter IV.

Opening No. 849 on Map II, on Fourpole Creek, 1.8 miles northeast of Wyoming, at an elevation of 1220′ B., was fallen shut when visited by Hennen and the thickness could not be measured.

The following exposure was examined by Hennen along the bed of a stream:

Coal Exposure—No. 850 on Map II.

On Sims Fork of Fourpole Creek, 3.4 miles northeast of Wyoming; **Lower War Eagle Coal**; elevation, 1240′ B.

	Feet	Inches
Slate, black, laminated	3	0
Coal, gas	2	0
Slate		

The Lower War Eagle Coal has been opened at numerous points along the waters of Guyandot River in the northern end of Stafford District.

The following opening was examined by Gawthrop:

Coal Opening—No. 851 on Map II.

On Spice Creek, 1.7 miles southeast of Christian; **Lower War Eagle Coal**; elevation, 970′ B.

			Feet	Inches
Sandstone, shaly				
Coal, gas, soft	1′	6″		
Coal, gas, harder	1	1	2	7
Shale				

The following opening was examined by Gawthrop:

Coal Opening—No. 852 on Map II.

On Sylvia Branch of Guyandot River, 1.6 miles southwest of Christian; **Lower War Eagle Coal**; elevation, 880′ B.

			Feet	Inches
Shale, black, flaggy			2	0
Coal, gas	0′	7″		
Shale	0	1		
Coal, visible	1	2		
Concealed, reported coal	1	2	3	0

The following opening was examined by Gawthrop:

Coal Opening—No. 853 on Map II.

On Guyandot River, 1.2 miles north of Gilbert; **Lower War Eagle Coal**; elevation, 950′ B.

	Feet	Inches
Shale, dark gray, flaggy	5	0
Coal, gas	1	6
Slate		

The following opening was examined by Gawthrop:

Coal Opening—No. 854 on Map II.

On Harry Branch of Guyandot River, 1.3 miles northeast of Gilbert; **Lower War Eagle Coal**; elevation, 1090′ B.

			Feet	Inches
Shale, dark gray			3	0
Coal, gas	0′	10″		
Shale, gray	1	0		
Coal, gas	0	3		
Coal, splinty	0	3		
Coal, gas	0	5		
Coal, splinty	0	5		
Coal, gas	0	3	3	5
Shale				

The Lower War Eagle Coal was once prospected at **Opening No. 855 on Map II,** on Stafford Branch of Guyandot River, 0.8 mile southeast of Gilbert, at an elevation of 1080′ B., where it was reported 3′ 4″ thick, with a 6″ parting, one foot from the top, but the opening was closed when visited by Gawthrop, and the section could not be verified.

The two following openings were examined by Hennen and Gawthrop:

Coal Opening—No. 856 on Map II.

On Horsepen Creek, 1 mile northwest of Horsepen; **Lower War Eagle Coal**; elevation, 935′ B.

	Feet	Inches
Shale, dark	10	0
Slate, black	1	0
Coal, gas	1	7
Sandstone, massive, to creek	15	0

Coal Opening—No. 857 on Map II.

On Horsepen Creek, 1.1 miles northwest of Horsepen; **Lower War Eagle Coal**; elevation, 930' B.

			Feet	Inches
Slate, black, laminated			10	0
Coal, soft	0'	6"		
Coal, splint	0	11½	1	5½
Slate				

The following opening was examined by Gawthrop:

Coal Opening—No. 858 on Map II.

On Gilbert Creek, 1.8 miles southwest of Horsepen; **Lower War Eagle Coal**; elevation, 990' B.

			Feet	Inches
Slate, black, flaggy			4	0
Coal, gas, soft	0'	6"		
Coal, gas, harder	1	0	1	6
Shale				

The following openings were examined by Hennen and Gawthrop:

Coal Opening—No. 859 on Map II.

On Gilbert Creek, 3 miles southwest of Gilbert; **Lower War Eagle Coal**; elevation, 1065' B.

			Feet	Inches
Shale				
Coal, gas, soft	0'	8"		
Coal, gas, harder	1	0		
Coal, splinty	1	0	2	8
Sandstone, massive				

Coal Opening—No. 860 on Map II.

On Gilbert Creek, 3 miles southwest of Gilbert; **Lower War Eagle Coal**; elevation, 1070' B.

			Feet	Inches
Slate, black			2	0
Coal, gas, medium hard	0'	6"		
Coal, gas, slightly harder	1	9	2	3
Slate and concealed, to creek			10	0

Coal Opening—No. 861 on Map II.

On Gilbert Creek, 3 miles southwest of Gilbert; **Lower War Eagle Coal**; elevation, 1080′ B.

	Feet	Inches
Slate, black		
Coal	2	3
Slate	3	6
Sandstone, massive, to creek	15	0

At **Opening No. 862 on Map II,** on Neds Branch of Guyandot River, 1.9 miles south of Gilbert, Gawthrop observed 2 feet of medium hard coal, at an elevation of 1090′ B., but the coal was partly concealed by water, being reported 2′ 6″ thick.

The two following openings were examined by Gawthrop:

Coal Opening—No. 863 on Map II.

On Neds Branch of Guyandot River, 1.2 miles west of Justice; **Lower War Eagle Coal**; elevation, 1150′ B.

			Feet	Inches
Slate, black			1	0
Coal, gas	0′	6″		
Slate black	0	1		
Coal, gas	0	2½		
Slate, black	0	2½		
Coal, hard	0	4		
Coal, gas	0	7		
Coal, hard	0	3		
Coal, gas	0	3	2	5
Slate				

Coal Opening—No. 864 on Map II.

On Neds Branch of Guyandot River, 1.5 miles southwest of Justice; **Lower War Eagle Coal**; elevation, 1155′ B.

			Feet	Inches
Slate, black			1	0
Coal, gas	0′	6½″		
Slate, black	0	0½		
Coal, gas	0	2½		
Slate black	0	2		
Coal, gas	0	4		
Coal, splinty	0	4		
Coal, gas	0	3		
Coal, splinty	0	5	2	3½
Slate				

The following opening was examined by Gawthrop near the McDowell County Line:

Coal Opening—No. 865 on Map II.

On Whiteoak Branch of Guyandot River; 1.5 miles southwest of Justice; **Lower War Eagle Coal**; elevation, 1240′ B.

			Feet	Inches
Shale, dark gray			3	0
Slate, black			1	0
Coal, gas	0′	10″		
Shale, dark gray	0	7		
Coal, gas	0	10		
Coal, splint	0	9	3	0
Slate				

"Character of coal in bottom member of section varies at different places."

The following exposure was examined by Gawthrop on another creek:

Coal Exposure—No. 866 on Map II.

On Leatherwood Creek, at the mouth of Wallace Fork, 3 miles northeast of Justice; **Lower War Eagle Coal**; elevation, 1105′ B.

			Feet	Inches
Shale, dark gray				
Coal, gas	1′	8″		
Slate, black	0	0½		
Coal	0	1		
Slate, black	0	1	1	10½
Shale, gray				

Quantity of Lower War Eagle Coal Available.

Based on the evidence of the preceding pages and with a planimetric determination of the area by Gawthrop, the following estimate is made of the probable amount of Lower War Eagle Coal in the area where it is known or believed to exist as shown by Figure 21:

Probable Amount of Lower War Eagle Coal.

Counties By Districts	Thickness of Coal. Assumed. Feet.	Square Miles	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Triadelphia (part).	1.5	30.00	19,200	1,254,528,000	50,181,120
Mingo:					
Magnolia (part)...	1.5	5.00	3,200	209,088,000	8,363,520
Stafford (entire)...	1.5	81.75	52,320	3,418,588,800	136,743,552
Totals for Mingo County		86.75	55,520	3,627,676,800	145,107,072
Totals for Both Counties		116.75	74,720	4,882,204,800	195,288,192

THE GLENALUM TUNNEL COAL.

The Glenalum Tunnel Coal, which has been named and briefly described in Chapter VI, pages 218-219, is of only secondary importance compared to some of the coals of the Kanawha Series. It is the lowest coal of possible commercial value in the series, and for this reason will eventually prove to be of more importance than if its horizon occurred at a higher level in close relation with the other coals that outrank it in thickness.

The coal is under drainage in a large part of the two counties, but the records of deep wells drilled in several places for oil and gas do not show any important deposits of coal at this horizon. So far as known, the coal is well developed only in the southeastern section of the two counties where the maximum thickness of the Kanawha Series occurs. Figure 22 shows the area where the Glenalum Tunnel Coal is known or believed to be of possible commercial value. The seam usually carries a large amount of slate and shale.

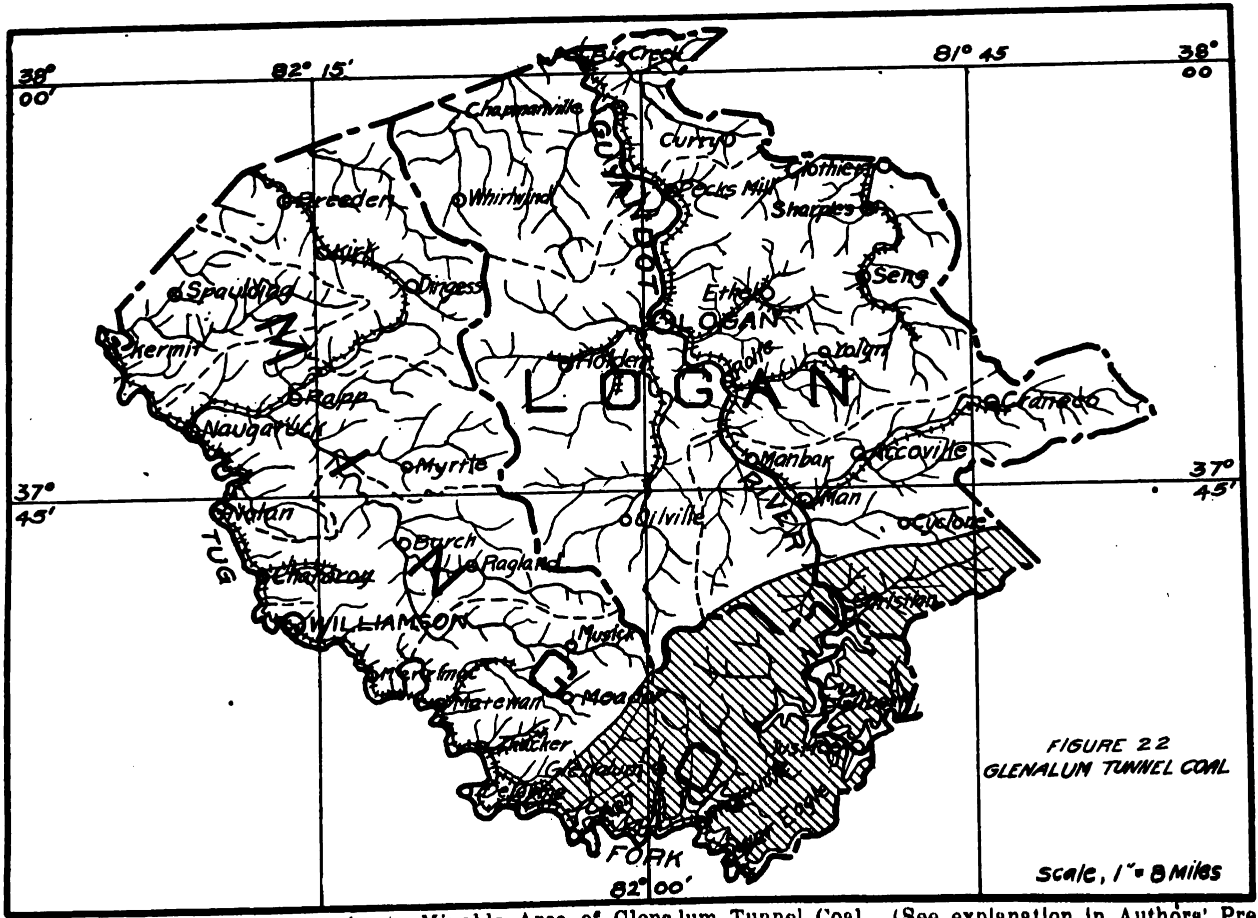

Figure 22. Showing Approximate Minable Area of Glenalum Tunnel Coal. (See explanation in Authors' Preface)

Triadelphia District, Logan County.

The Glenalum Tunnel Coal crops in Triadelphia District only in the southern end, next to Stafford.

The two following openings were examined by Hennen:

Coal Exposure—No. 867 on Map II.

On Guyandot River, 0.5 mile northwest of Christian; **Glenalum Tunnel Coal**; elevation, 750′ B.

	Feet	Inches
Sandstone, massive	6	0
Shale, sandy, buff	5	0
Coal	1	2
Concealed	10	0
Sandstone, massive, to river	5	0

Coal Opening—No. 868 on Map II.

On Elk Creek, 1.1 miles northeast of Christian; **Glenalum Tunnel Coal**; elevation, 825′ B.

	Feet	Inches
Sandstone, massive, Upper Gilbert	25	0
Shale	15	0
Coal, gas, columnar, medium hard	2	3
Slate and concealed to creek	4	0

Magnolia District, Mingo County.

In Magnolia District, the Glenalum Tunnel Coal is noted in the section for Devon, where it is 2 feet thick. It is exposed at several points along Tug Fork.

The following exposure was examined by Hennen:

Coal Exposure—No. 869 on Map II.

On Tug Fork, 0.8 mile east of Cedar; **Glenalum Tunnel Coal**; elevation, 750′ L.

	Feet	Inches
Shale, sandstone and shale from Lower War Eagle Coal	75	0
Coal, Glenalum Tunnel	1	3
Shale, gray		

Another exposure, examined by Hennen, shows the following:

Coal Exposure—No. 870 on Map II.

On Tug Fork, 0.9 mile northwest of Devon; **Glenalum Tunnel Coal;** elevation, 753′ L.

			Feet	Inches
Shale				
Coal, gas	1′	4″		
Shale, gray	0	2		
Coal, slaty	0	2		
Coal, splinty	0	4		
Bone	0	1		
Coal, gas	0	6		
Shale, gray, with streaks of coal	1	2		
Coal, splinty	0	6	4	3
Fire clay				

The following opening was examined by Gawthrop:

Coal Opening—No. 871 on Map II.

On Beech Creek, 0.6 mile northeast of Devon; **Glenalum Tunnel Coal;** elevation, 770′ B.

			Feet	Inches
Shale, dark, slaty			10	0
Coal, gas	1′	4″		
Slate	0	0½		
Coal, gas	0	6	1	10½
Slate				

The following exposure was examined by Hennen:

Coal Exposure—No. 872 on Map II.

On Tug Fork, 0.7 mile southeast of Devon; **Glenalum Tunnel Coal;** elevation, 775′ B.

			Feet	Inches
Sandstone, shaly, and shale sandy			10	0
Coal, gas	1′	5″		
Shale, gray	0	0½		
Coal, gas	1	3		
Shale, dark gray	0	2		
Coal, gas	0	6		
Shale	1	0		
Sandstone, shaly at top, massive at bottom	11	0		
Coal	1	3		
Coal, slaty	0	6	17	1½
Shale, sandy			1	0
Sandstone, massive, Lower War Eagle, to rail road grade			11	0

The two following exposures were examined by Hennen:

Coal Exposure—No. 873 on Map II.

On Tug Fork, 1.1 miles east of Devon; **Glenalum Tunnel Coal;** elevation, 783′ L.

			Feet	Inches
Sandstone, shaly, laminated			13	0
Coal, gas	1′	10″		
Slate, gray	0	1½		
Coal, gas	0	5		
Slate, gray	0	1		
Coal, gas	0	4		
Fire clay shale	3	0		
Sandstone, massive, bluish gray, medium grained	15	0		
Coal, gas	1	0	21	9½
Sandstone, massive, Lower Gilbert, to railroad grade			6	0

Coal Exposure—No. 874 on Map II.

On Tug Fork, 1.1 miles northeast of Devon; **Glenalum Tunnel Coal;** elevation, 783′ L.

			Feet	Inches
Shale, dark gray			3	0
Coal, gas	1′	6″		
Shale, dark gray	0	1		
Coal, gas	0	6		
Slate, dark gray	0	2		
Coal, gas	0	9		
Bone	0	1		
Coal, gas	0	6	3	7
Sandstone massive, Lower Gilbert, to railroad grade			5	0

Stafford District, Mingo County.

In Stafford District, where the Glenalum Coal is best developed, several prospects have been made. In Chapter IV, it is noted in the section for War Eagle, where it is 11 inches thick, and in Chapter VI, it is recorded in that for Glenalum Tunnel, its type locality, where it is 29′ 10″ thick, but shaly.

The following exposure was examined by Hennen:

Coal Exposure—No. 875 on Map II.

On Tug Fork, 0.5 mile northwest of Lindsey; **Glenalum Tunnel Coal**; elevation of lower bench, 790′ B.

	Feet	Inches
Coal, upper bench	3	0
Shale, gray	10	0
Sandstone, massive	25	0
Coal, gas, lower bench	0	8
Fire clay	1	6
Sandstone, massive, Lower Gilbert, to railroad grade	10	0

The following exposure was examined by Hennen:

Coal Exposure—No. 876 on Map II.

On Tug Fork, 0.3 mile east of Lindsey; **Glenalum Tunnel Coal**; elevation of lower bench, 795′ B.

				Feet	Inches
Sandstone, flaggy				10	0
Coal, gas, soft	2′	0″	Upper Bench	5	11
Shale, gray	1	10			
Coal, gas, soft	0	10			
Slate, gray	0	2			
Coal, gas	0	7			
Bone coal	0	2			
Coal, gas	0	4			
Sandstone, massive				15	0
Coal gas, lower bench				0	7
Shale, dark				1	6
Sandstone, massive, Lower Gilbert, to railroad grade				7	0

The following exposure was examined by Hennen:

Coal Exposure—No. 877 on Map II.

On Tug Fork at the west portal of the Glenalum Tunnel, at Glenalum Junction; **Glenalum Tunnel Coal**; elevation of upper bench, 885′ B.

				Feet	Inches
Sandstone, massive					
Coal, gas	0′	8″	Upper Bench	4	3
Shale, gray	0	7			
Coal. gas	1	1			
Shale gray	0	6			
Coal	0	3			
Shale, gray	0	5			
Coal, gas	0	9			
Sandstone, shaly, and shale, sandy				9	6
Coal, lower bench				0	6
Shale					

Opening No. 878 on Map II, at the east portal of the Glenalum Tunnel, is published under the section for Glenalum Tunnel, in Chapter VI.

The following exposure was examined by Gawthrop:

Coal Exposure—No. 879 on Map II.

On Alum Creek, 0.9 mile north of Glenalum Junction; **Glenalum Tunnel Coal**; elevation, 880′ B.

			Feet	Inches
Sandstone, massive			8	0
Coal, gas	0′	7″		
Shale, gray	1	2		
Coal, gas	0	6	2	3
Shale, gray			5	0
Shale and concealed to creek			5	0

The following exposure was examined by Hennen in the edge of McDowell County:

Coal Exposure—No. 880 on Map II.

On Fourpole Creek, 2.7 miles northeast of Wyoming; **Glenalum Tunnel Coal**; elevation, 1140′ B.

	Feet	Inches
Sandstone, massive, cliff	15	0
Coal, gas	1	0
Sandstone, massive		

On the waters of Guyandot River some openings have been made. The following was examined by Gawthrop:

Coal Exposure—No. 881 on Map II.

On Spice Creek, 1.5 miles southwest of Christian; **Glenalum Tunnel Coal**; elevation, 890′ B.

			Feet	Inches
Shale, dark gray, flaggy			8	0
Coal, gas, medium hard	1′	0″		
Coal, gas, harder	1	0	2	0

The three following openings were examined by Gawthrop:

Coal Opening—No. 882 on Map II.

On Guyandot River, 1.8 miles southwest of Christian; **Glenalum Tunnel Coal**; elevation, 865′ B.

	Feet	Inches
Sandstone, shaly		
Coal, gas	1	9
Shale		

Coal Opening—No. 883 on Map II.

On Guyandot River, 2 miles S. 5° W. of Christian; **Glenalum Tunnel Coal**; elevation, 870′ B.

	Feet	Inches
Sandstone, massive	5	0
Shale, dark, flaggy	3	0
Coal gas	1	9
Shale		

Coal Opening—No. 884 on Map II.

On Guyandot River, 2.5 miles southwest of Christian; **Glenalum Tunnel Coal**; elevation, 870′ B.

	Feet	Inches
Sandstone, massive	10	0
Shale, sandy	5	0
Coal, gas	1	9
Shale		

Opening No. 885 on Map II, on a short branch of Guyandot River, 1.1 miles north of Gilbert, was fallen shut when visited by Gawthrop, but the coal was reported 1′ 6″ thick, with a parting.

Quantity of Glenalum Tunnel Coal Available.

Based on the evidence in the preceding pages and with an areal determination by Gawthrop, the following estimate is made of the probable amount of Glenalum Tunnel Coal. The thickness assumed is purposely made low because the slaty and shaly character of the seam makes it certain that there will be a considerable waste if mining is ever attempted. Only the area shown on Figure 22 is included in this estimate:

Probable Amount of Glenalum Tunnel Coal.

Counties by Districts.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Logan:					
Triadelphia (part).....	1	30.00	19,200	836,352,000	33,454,080
Mingo:					
Magnolia (part)........	1	11.00	7,040	306,662,400	12,266 496
Stafford (entire).......	1	83.00	53,120	2,313,907,200	92,556,288
Totals for Mingo County.		94.00	60,160	2,620,569,600	104,822,784
Totals for Both Counties		124.00	79,360	3,456,921,600	138,276,864

COALS OF THE NEW RIVER AND POCAHONTAS SERIES.

Evidence regarding the presence of the great coal seams of the New River and Pocahontas Series in Logan and Mingo Counties is scanty. Enough deep wells have been drilled for oil and gas in Chapmanville District, Logan County, and in Warfield District, Mingo County, to warrant the statement that deep drilling for the coals of these two series in these districts would prove unsuccessful. In a few of these wells a coal has been found at a varying interval below the Campbell Creek (No. 2 Gas) that has been doubtfully correlated with the Sewell (Davy) seam of the New River Series, but the wells in which it has been found are too widely separated to make it certain that the same seam is noted in each instance.

In other districts farther southeast, little drilling has been done. It is possible that in Stafford District, Mingo County, in the extreme southeastern corner of the area treated in this Report, the Sewell, and possibly some other coals below the Kanawha Series, may exist in minable quantity, since these coals are mined at their outcrop in McDowell County twelve miles or more east of the Stafford District Line. Core testing, if done at all, should be commenced near the outcrop of these coals in McDowell County and extended gradually westward into Stafford District as long as good coal is found. If good coal should be discovered under drainage in Stafford District, core testing could then be continued westward as long as it proved profitable.

The following table gives a list of those wells in which coals of the New River and Pocahontas Series have been reported. In the column under "Interval below Campbell Creek Coal", numbers in parentheses indicate that this interval was obtained from the structure contours on Map II, direct measurement not being possible:

Coals of the New River and Pocahontas Series Recorded in Oil Wells.

Name of Well and Name of Coal.	No. on Map II.	Depth of Coal. Top.	Thickness.	Interval Below Campbell Creek Coal.
New River Series:				
Sewell (Davy) Coal?				
Wm. Lucas No. 1	3	590	6	577
Miller & Harvey No. 3	9	645	5	677
Miller & Harvey No. 2	11	540	4	610
Guyandot Land Association	103	1011	6	796
Rhoda Brewer No. 109	118	696	6	(666)
James Brewer No. 446	127	755	3	(755)
Buffalo Land Co. No. 1	160	1100	5	1015
Jackson Mounts No. 1	161	1100	..	1527
Pocahontas Series:				
Coals unidentified:				
Wm. Ellis No. 1	76	1252	8	1111
L. V. Surtain No. 112	116	1200	..	(1065)
Rhoda Brewer No. 109	118	875	15	(845)

See Index for page references to complete logs of wells listed above.

SUMMARY OF AVAILABLE COAL.

For convenience of reference, all the mines and prospects in the 18 commercial seams described in this Chapter have been given serial numbers, which are printed in blue on Map II along with the mine symbols. The following table gives a list of these numbers, as well as a summary of the total amount of coal that each seam is estimated to contain:

Summary of Available Coal.

Coal Seam.	Mines and Prospects Listed on Map II and Described in Chapter VIII.	Short Tons (2,000 Lbs.) of Coal.	
		Logan County	Mingo County
Upper Kittanning...	1	....	....
No. 5 Block........	2 and 154-158	139,278,743	107,317,900
Stockton	3 and 159-166	307,777,536	183,161,088
Coalburg	4- 18 and 167-216	509,394,124	496,554,379
Buffalo Creek	20- 29 and 217-218	....	258,990,336
Winifrede	30- 32 and 219-236	432,672,768	408,251,288
Chilton "A"	33- 34 and 237-245	234,178,560	182,134,814
Chilton	35- 59 and 246-352	1,072,760,831	639,485,193
Dingess	60- 62A and 353-395	373,570,560	254,808,576
Williamson	63- 67 and 396-450	675,772,416	401,448,960
Cedar Grove........	68-112 and 451-559	1,464,305,990	627,575,889
Lower Cedar Grove.	113-118 and 560-599	517,423,104	486,756,864
Alma	119-131 and 600-704	838,582,272	431,446,118
Campbell Creek.....	132-144 and 705-793	1,284,190,617	1,163,923,200
Eagle	145-150 and 794-815	173,961,216	142,737,408
Bens Creek.........	816-829	42,375,168	148,313.088
Cedar	151 and 830-835	....	149,428,224
Lower War Eagle..	152-153 and 836-866	50,181,120	145,107,072
Glenalum Tunnel..	867-885	33,454,080	104,822,784
Totals	....	8,149,879,105	6,332,263,181
Totals for Both Counties	....	....	14,482,142 286

This summary represents the amount of coal believed to have once been available for mining in the two counties. The Annual Report of the West Virginia Department of Mines, for the year ending June 30, 1912, shows that 31,683,910 long tons of coal had been mined in the two counties. If this be computed on a short ton basis (2000 pounds), the total is 35,485,979 tons. For the two years elapsed since this Report was published, perhaps enough coal has been mined to make the total 48,000,000 short tons. The amount of coal unrecovered in old pillars will probably bring the total to 60,000,000 short tons, the sum to be deducted from the figures given above in the summary. When this correction is made, the amount of coal still available for mining is 14,421,142,286 short tons. Allowing for an average recovery of 80 per cent., which is possible by modern mining methods, the probable amount of coal to be eventually mined in the two counties is in round numbers 11,535,000,000 short tons.

MINABLE COAL BY MAGISTERIAL DISTRICTS.

The minable coals of the two counties have been described by magisterial districts on previous pages of this Chapter. In the Index, at the end of this Report, under the title of "Minable Coals by Magisterial Districts", will be found a list of page references making this information readily available for the study of any particular district. In this list only the coals are included which are present in considerable quantity.

TABLE OF COAL ANALYSES.

The following table, containing the chemical analysis, calorific determination and fuel ratio of 153 mines and prospects, sampled in the territory of this Report, is the exclusive work of members of the Survey Staff. All samples were taken by members of the force in the field. Those from the commercial mines were collected according to the strict method outlined by the U. S. Bureau of Mines, being quartered and sealed in tins in the mines. The samples from the country mines were collected in sacks with as much care as could be observed when depending on a scanty saddle bag equipment.

The chemical work was mostly done by J. B. Krak, Assistant Chemist, under the direction and with the assistance of B. H. Hite, Chief Chemist. Some of the analyses, previously published in Volumes II and II(A), and made under the same careful conditions, are the work of former chemists of the Survey. The numbers at the left-hand margin correspond to the numbers given with the mine sections in the text and with the mine symbols on Map II:

TABLE OF

(Under the heading, "Condition of Sample",

No. on Map II.	Mine.	County.	Horizon.
1	Lewis Maynard	Logan	Upper Kittanning, Min Sect
2	Jack Williams	Mingo	No. 5 Block, Min. Sect
3	United Thacker Coal Co.	Mingo	Stockton, Min. Sect
4	Boone County Coal Corp.	Logan	Coalburg, Min. Sect
5	Paris Jarrold	Logan	Coalburg, Min. Sect
6	Unknown	Logan	Coalburg, Min. Sect
7	Wood, Cole and Crane	Logan	Coalburg, Min. Sect
8	Thomas Curry	Logan	Coalburg, Min. Sect
9	Jefferson Adkins	Mingo	Coalburg, Min. Sect
10	Mingo Block Coal Co.	Mingo	Coalburg, Min. Sect
10	Mingo Block Coal Co.	Mingo	Coalburg, Min. Sect
11	Mingo Block Coal Co.	Mingo	Coalburg, Min. Sect
11	Mingo Block Coal Co.	Mingo	Coalburg, Min. Sect
12	Big Block Coal Co.	Mingo	Coalburg, Min. Sect
13	J. R. Shanklin Coal Co.	Mingo	Coalburg, Min. Sect
13	J. R. Shanklin Coal Co	Mingo	Coalburg, Min. Sect
14	Howard Jr. Colliery Co. (Howard Jr.)	Mingo	Coalburg, Min. Sect
14	Howard Jr. Colliery Co. (Howard Jr.)	Mingo	Coalburg, Min. Sect
15	Buffalo Collieries Co.	Mingo	Coalburg, Min. Sect
15	Buffalo Collieries Co.	Mingo	Coalburg, Min. Sect
16	Howard Collieries Co. (Howard)	Mingo	Coalburg, Min. Sect
16	Howard Collieries Co. (Howard)	Mingo	Coalburg, Min. Sect
17	Sycamore Coal Co. (Cinderella)	Mingo	Coalburg, Min. Sect
17	Sycamore Coal Co. (Cinderella)	Mingo	Coalburg, Min. Sect
18	Crystal Block Coal & Coke Co.	Mingo	Coalburg, Min. Sect
18	Crystal Block Coal & Coke Co.	Mingo	Coalburg, Min. Sect
	Average	**Logan & Mingo**	**Coalburg Min. Sect**
	Average (Same Samples)	**Logan & Mingo**	**Coalburg Min. Sect**
19	Boone County Coal Corporation	Logan	Little Coalburg Min. Sect
20	Culross Coal Co.	Mingo	Buffalo Creek, Min. Sect
20	Culross Coal Co.	Mingo	Buffalo Creek, Min. Sect
21	Mary Helen Coal Co.	Mingo	Buffalo Creek, Min. Sect
21	Mary Helen Coal Co.	Mingo	Buffalo Creek, Min. Sect
22	Howard Jr. Colliery Co. (Howard, Jr.)	Mingo	Buffalo Creek, Min. Sect
22	Howard Jr. Colliery Co. (Howard, Jr.)	Mingo	Buffalo Creek, Min. Sect
23	Buffalo Collieries Co.	Mingo	Buffalo Creek, Min. Sect
23	Buffalo Collieries Co.	Mingo	Buffalo Creek, Min. Sect
24	Howard Collieries Co. (Frederick)	Mingo	Buffalo Creek, Min. Sect
24	Howard Colleries Co. (Frederick)	Mingo	Buffalo Creek, Min. Sect
25	Howard Collieries Co (Howard)	Mingo	Buffalo Creek, Min. Sect
25	Howard Collieries Co (Howard)	Mingo	Buffalo Creek, Min. Sect
26	E. L. Sternberger Coal Co.	Mingo	Buffalo Creek Min. Sect
26	E. L. Sternberger Coal Co.	Mingo	Buffalo Creek Min. Sect
27	Sycamore Coal Co. No. 2	Mingo	Buffalo Creek Min. Sect
27	Sycamore Coal Co. No. 2	Mingo	Buffalo Creek Min. Sect
28	Crystal Block Coal & Coke Co.	Mingo	Buffalo Creek Min. Sect
28	Crystal Block Coal & Coke Co.	Mingo	Buffalo Creek Min. Sect
29	Williamson C. & C. Co. No. 3	Mingo	Buffalo Creek Min. Sect
29	Williamson C. & C. Co. No. 3	Mingo	Buffalo Creek Min. Sect
	Average	**Logan & Mingo**	**Buffalo Creek Min. Sect**
	Average (Same Samples)	**Logan & Mingo**	**Buffalo Creek Min. Sect**
30	Paris Jarrold Heirs	Logan	Winifrede, Min. Sect
31	John Deskins	Mingo	Winifrede, Min. Sect
32	Melvin Justice	Mingo	Winifrede, Min. Sect
	Average	**Logan & Mingo**	**Winifrede, Min. Sect**
33	H. C. Closterman	Mingo	Chilton "A". Cannel
34	Hiram Stafford	Mingo	Chilton "A", Min. Sect
35	E. R. Johnson Coal Mining Co.	Logan	Chilton, Mining Section
35	E. R. Johnson Coal Mining Co.	Logan	Chilton, Mining Section
36	Sunbeam Coal Co.	Logan	Chilton, Mining Section
36	Sunbeam Coal Co.	Logan	Chilton, Mining Section
37	Fort Branch Coal Co.	Logan	Chilton, Mining Section
37	Fort Branch Coal Co.	Logan	Chilton, Mining Section
38	Logan Mining Co. (Wanda)	Logan	Chilton, Mining Section
38	Logan Mining Co. (Wanda)	Logan	Chilton, Mining Section

COAL ANALYSES.

"A.D."=air dried, and "A.R."=as received.)

Condition of Sample.	Proximate.				Common to Both.		Ultimate.				Calorimeter B. T. U. for one lb. of coal.	Calculated B. T. U. for one lb. of coal.	Carbon Divided by Oxygen+Ash.
	Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
A. R.	0.94	39.91	51.11	.004	8.04	0.74							
A. R.	1.81	38.82	47.59	.008	11.78	0.77	....	....	.....	....	....	....	....
A. R.	1.46	34.99	49.76	.003	13.79	0.60	....	....	.....	....	....	....	....
A. R.	1.12	35.84	51.97	.004	11.07	0.89	....	....	.....	....	....	....	....
A. R.	0.93	38.25	53.76	.004	7.06	0.93	....	....	.....	....	....	....	....
A. R.	1.96	36.74	53.78	.008	7.52	0.65	....	....	.....	....	....	....	....
A. R.	1.31	41.12	53.79	.007	3.78	0.85	....	....	.....	....	....	....	....
A. R.	1.05	36.04	52.87	.004	10.04	0.84	....	....	.....	....	....	....	....
A. R.	1.58	32.56	55.01	.010	10.85	0.82	....	....	.....	....	....	....	....
A. D.	3.30	29.48	54.43	.005	12.79	0.77	69.14	4.18	12.05	1.07	12,051	11,742	2.78
A. R.	4.15	29.21	53.96	.005	12.68	0.77	68.53	4.28	12.68	1.06	11,945	11,673	2.70
A. D.	2.65	31.41	52.11	.011	13.83	0.60	68.54	4.23	11.75	1.05	12,216	11.583	2.68
A. R.	3.74	31.06	51.52	.011	13.68	0.60	67.77	4.35	12.56	1.04	12,079	11,482	2.58
A. R.	1.20	39.36	52.70	.007	6.74	0.76	....	....	.....	....	....	....	....
A. D.	2.82	38.62	53.44	.006	5.12	0.77	77.57	5.29	9.76	1.49	13,770	13,840	5.22
A. R.	4.02	38.15	52.77	.006	5.06	0.76	76.62	5.36	10.73	1.47	13,600	13,670	4.85
A. D.	0.94	37.44	51.90	.005	9.72	0.82	74.81	4.89	8.53	1.23	13,290	13,280	4.10
A. R.	2.24	36.95	51.22	.005	9.59	0.81	73.88	4.97	9.58	1.22	13,120	13,110	3.85
A. D.	1.08	38.09	50.53	.008	10.30	0.98	73.11	5.22	9.20	1.19	13,190	13,200	3.75
A. R.	2.51	37.54	49.80	.008	10.15	0.97	72.05	5.31	10.34	1.18	13,000	13,010	3.52
A. D.	1.09	39.01	51.63	.006	8.27	0.84	75.72	5.27	8.63	1.27	13,640	13,650	4.48
A. R.	1.99	38.66	51.15	.006	8.20	0.83	75.03	5.32	9.36	1.26	13,510	13,520	4.27
A. D.	1.11	36.67	54.81	.004	7.91	0.80	75.92	5.10	9.03	1.24	13,690	13,540	4.48
A. R.	2.39	36.19	53.62	.004	7.80	0.79	74.94	5.17	10.07	1.23	13,510	13,370	4.19
A. D.	1.06	39.47	53.93	.005	5.54	0.71	78.70	5.57	8.06	1.42	14,250	14,310	5.79
A. R.	2.32	38.97	53.24	.005	5.47	0.70	77.70	5.65	9.07	1.41	14,070	14,130	5.34
A. D.	**1.76**	**36.27**	**52.79**	**.006**	**9.18**	**0.78**	**74.19**	**4.97**	**9.63**	**1.25**	**13,262**	**13,143**	**3.93**
A. R.	**2.92**	**35.84**	**52.16**	**.006**	**9.08**	**0.78**	**73.31**	**5.05**	**10.55**	**1.23**	**13,104**	**12,995**	**3.73**
A. R.	2.00	40.71	54.06	.004	3.23	0.88	....	....	.....	....	....	....	....
A. D.	2.00	36.24	55.61	.011	6.15	1.29	78.17	4.78	8.33	1.28	13,671	13,743	5.39
A. R.	2.57	36.03	55.28	.011	6.12	1.29	77.72	4.84	8.75	1.28	13,592	13,698	5.23
A. D.	2.00	32.48	56.74	.006	8.78	0.93	74.40	4.55	10.13	1 21	13,345	12,884	3.93
A. R.	2.38	32.36	56.51	.006	8.75	0.93	74.12	4.59	10.40	1.21	13,294	12,868	3.87
A. D.	2.95	34.15	57.90	.004	5.00	0.53	79.10	4.65	9.51	1.21	13,706	13,673	5.45
A. R.	3.51	33.95	57.57	.004	4.97	0.53	78.64	4.71	9 94	1.21	13,627	13,609	5.34
A. D.	2.00	33.50	59 78	.004	4.72	0.75	79.91	4.67	8.73	1.22	14,002	13,876	5.94
A. R.	2.28	33.41	59.59	.004	4.71	0.75	79.69	4.70	8.93	1.22	13,963	13.842	5.84
A. D.	2.45	35.13	58.30	.003	4.12	0.61	79.09	4.67	10.24	1.27	13,853	13,630	5.51
A. R.	3.01	34.93	57.96	.003	4.10	0.61	78.65	4.73	10.64	1.27	13,774	13,572	5.34
A. D.	2.75	32.95	58.50	.005	5.80	0.58	76.98	4.84	10.60	1.20	13,475	13,401	4.69
A. R.	3.25	32.79	58.18	.005	5.78	0.58	76.59	4.90	10.95	1.20	13,407	13,352	4.58
A. D.	1.35	39.96	54 15	.007	4.54	0.70	79.18	5.44	8.83	1.31	14.180	14,240	5.92
A. R.	2.89	39.34	53.30	.007	4.47	0.69	77.95	5.53	10 07	1.29	13,960	14,020	5.36
A. D.	0.92	38.93	56.33	.004	3.82	0.76	80.19	5.32	8.58	1.33	14,460	14,330	6.47
A. R.	2.19	38.43	55 61	.004	3.77	0.75	79.16	5.39	9.61	1.32	14,280	14,150	5.91
A. D.	1.19	39.15	55.54	.006	4.12	0.59	80.41	5.33	8.07	1.48	14,510	14,410	6.59
A. R.	2.34	38.69	54.90	.006	4.07	0.58	79.47	5.40	9.01	1.47	14,340	14.240	6.08
A. D.	0.81	40.58	54.38	.004	4.23	0.80	79.71	5.41	8.52	1.33	14,320	14,320	5.80
A. R.	2.26	39.99	53 58	.004	4.17	0.79	78.54	5.49	9 69	1.32	14.110	14.110	5.66
A. D.	**1.84**	**36.31**	**56.72**	**.005**	**5.13**	**0.75**	**78.72**	**4.97**	**9.15**	**1.28**	**13.952**	**13.851**	**5.51**
A. R.	**2.67**	**35.99**	**56 25**	**.005**	**5.09**	**0.75**	**78.05**	**5.03**	**9.80**	**1.28**	**13,835**	**13,746**	**5.25**
A. R.	1.22	38.79	56.38	.008	3.61	0.78	....	....	.....	....	....	....	....
A. R	1.30	41.41	51.63	.004	5.66	0.71	....	....	.....	....	....	....	....
A. R.	1.27	39.11	53.20	.004	6.42	0.56	....	....	.....	....	....	....	....
A. R.	**1.26**	**39.77**	**53 74**	**.005**	**5.23**	**0.68**	....	....	.....	....	....	....	....
A. R.	0.39	58.16	27.46	.008	13.99	0.66	....	....	.....	....	....	....	....
A. R.	1.52	40.17	46.90	.006	11.41	0.66	....	....	.....	....	....	....	....
A. D.	1.28	38.60	53.49	.010	6.63	0.63	77 38	5.56	8.50	1.30	13,930	13,970	5.11
A. R.	2.46	38.14	52.85	.010	6.55	0.62	76.46	5.62	9.46	1.29	13,770	13,810	4.77
A. D.	0.71	40.81	53.65	.006	4.83	0.87	79.28	5.46	8.12	1.44	14,470	14.330	6.12
A. R.	1.74	40.39	53.09	.006	4.78	0.86	78.46	5.51	8 96	1.43	14,320	14,180	5.85
A. D.	1.60	35 10	58.77	.006	4.53	0.98	80 65	4.78	7.79	1.27	14,255	14.133	6.55
A. R.	1.91	34.99	58.58	.006	4.52	0.98	80 39	4.82	8.02	1.27	14.210	14.099	6.41
A. D.	1.65	32.40	61.19	.005	4.76	0.74	80.73	4.44	8.13	1.20	14,268	13,893	6.26
A. R.	1.84	32.34	61.07	.005	4.75	0.74	80.58	4.46	8.27	1.20	14,240	13,878	6.19

TABLE OF

(Under the heading, "Condition of Sample",

No. on Map II.	Mine.	County.	Horizon.
39	Rex Coal & Coke Co	Logan	Chilton, Mining Section
39	Rex Coal & Coke Co	Logan	Chilton, Mining Section
40	Logan Mining Co. (Logan)	Logan	Chilton, Mining Section
40	Logan Mining Co. (Logan)	Logan	Chilton, Mining Section
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Mining Section
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Mining Section
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Upper Bench
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Upper Bench
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Lower Bench
41	Logan Mining Co. (Manitoba)	Logan	Chilton, Lower Bench
42	Ethel Coal Co	Logan	Chilton, Mining Section
42	Ethel Coal Co	Logan	Chilton, Mining Section
43	Freeze Fork Coal Co	Logan	Chilton, Mining Section
43	Freeze Fork Coal Co	Logan	Chilton, Mining Section
44	Georges Creek Coal Co	Logan	Chilton, Mining Section
44	Georges Creek Coal Co	Logan	Chilton, Mining Section
44	Georges Creek Coal Co	Logan	Chilton, Upper Bench
44	Georges Creek Coal Co	Logan	Chilton, Upper Bench
44	Georges Creek Coal Co	Logan	Chilton, Lower Bench
44	Georges Creek Coal Co	Logan	Chilton, Lower Bench
45	Argyle Coal Co	Logan	Chilton, Mining Section
45	Argyle Coal Co	Logan	Chilton, Mining Section
46	Paragon Colliery Co	Logan	Chilton, Mining Section
46	Paragon Colliery Co	Logan	Chilton, Mining Section
47	McGregor Coal Co	Logan	Chilton, Mining Section
47	McGregor Coal Co	Logan	Chilton, Mining Section
48	Sovereign Coal Co	Logan	Chilton, Mining Section
48	Sovereign Coal Co	Logan	Chilton, Mining Section
48	Sovereign Coal Co	Logan	Chilton, Cannel
48	Sovereign Coal Co	Logan	Chilton, Cannel
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Mining Section
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Mining Section
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Upper Bench
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Upper Bench
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Lower Bench
49	D. C. Thomas Coal Co. (Grace)	Logan	Chilton, Lower Bench
50	Upperman Coal Co	Logan	Chilton, Mining Section
50	Upperman Coal Co	Logan	Chilton, Mining Section
51	Spruce Valley Coal Co	Logan	Chilton, Mining Section
51	Spruce Valley Coal Co	Logan	Chilton, Mining Section
52	Spruce Bend Coal Co	Logan	Chilton, Mining Section
52	Spruce Bend Coal Co	Logan	Chilton, Mining Section
53	Coal River C. & C. Co	Logan	Chilton, Mining Section
53	Coal River C. & C. Co	Logan	Chilton, Mining Section
54	Mifflin Coal Co	Logan	Chilton, Mining Section
54	Mifflin Coal Co	Logan	Chilton, Mining Section
55	Coal Valley Mining Co	Logan	Chilton, Mining Section
55	Coal Valley Mining Co	Logan	Chilton, Mining Section
56	Amherst Coal Co	Logan	Chilton, Mining Section
56	Amherst Coal Co	Logan	Chilton, Mining Section
57	George Hannah	Mingo	Chilton, Mining Section
58	Evan Akers	Mingo	Chilton, Mining Section
59	John Vance	Mingo	Chilton, Mining Section
	Average	**Logan & Mingo**	**Chilton, Mining Section**
	Average (Same Samples)	**Logan & Mingo**	**Chilton, Mining Section**
	Average	**Logan**	**Chilton, Upper Bench**
	Average (Same Samples)	**Logan**	**Chilton, Upper Bench**
	Average	**Logan**	**Chilton, Lower Bench**
	Average (Same Samples)	**Logan**	**Chilton, Lower Bench**
60	P. J. Dingess	Logan	Dingess, Mining Section
61	Harvey Dingess	Logan	Dingess, Mining Section
62	Guyandot Land Association	Mingo	Dingess, Mining Section
62A	Marion Timbering Co	Mingo	Dingess, Mining Section
62A	Marion Timbering Co	Mingo	Dingess, Mining Section
63	Unknown	Logan	Williamson, Mining Section
64	L. D. Starr	Mingo	Williamson, Mining Section
65	Mary Helen Coal Co	Mingo	Williamson, Mining Section
65	Mary Helen Coal Co	Mingo	Williamson, Mining Section

COAL ANALYSES.

“A.D.”=air dried, and “A.R.”=as received.)

Condition of Sample.	Proximate.				Common to Both.		Ultimate.				Calorimeter B. T. U. for one lb. of coal.	Calculated B. T. U. for one lb. of coal.	Carbon Divided by Oxygen+Ash.
	Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
A. D.	1.55	33.55	58.60	.008	6.30	0.66	80.46	4.41	6.98	1.19	14,093	13.924	6.06
A. R.	1.82	33.46	58.44	.008	6.28	0.66	80.32	4.44	7.11	1.19	14,054	13,909	6.00
A. D.	1.25	31.55	57.90	.009	9.30	1.29	74.03	4.37	9.82	1.19	12,906	12,776	3.87
A, R.	1.52	31.47	57.73	.009	9.28	1.29	73.83	4.40	10.01	1.19	12,871	12,747	3.82
A, D.	0.61	38.83	53.91	.004	6.65	0.67	78.77	5.21	7.14	1.56	14,150	14,160	5.71
A. R.	1.47	38.50	53.44	.004	6.59	0.67	78.09	5.26	7.84	1.55	14.030	14.040	5.41
A. D.	0.68	37.82	56.52	.013	4.98	0.58	80.43	5.36	7.20	1.45	14.470	14.490	6.60
A R.	1.60	37.47	56.00	.013	4.93	0.58	79.69	5.41	7.95	1.44	14,340	14,360	6.19
A, D.	0.94	37.99	54.07	.007	7.00	0.73	78.61	5.02	7.25	1.39	14,080	14,020	5.51
A. R.	2.15	37.53	53.41	.007	6.91	0.73	77.65	5.09	8.24	1.38	13,910	13,850	5.12
A. D.	1.25	33.03	58.86	.005	6.86	0.62	76.97	4.61	9.69	1.25	13,614	13,833	4.65
A. R.	1.52	32.94	58.70	.005	6.84	0.62	76.76	4.64	9.89	1.25	13,577	13,289	4.57
A, D.	0.56	35.09	56.75	.007	7.60	0.67	78.24	5.21	6.72	1.56	14.010	14.120	5.46
A. R.	1.53	34.75	56.19	.007	7.53	0.67	77.48	5.26	7.51	1.55	13,880	13,980	5.15
A. D.	0.21	38.24	57.64	.011	3.91	0.58	82.01	5.08	6.94	1.48	14,560	14,560	7.56
A. R.	1.41	37.78	56.95	.011	3.86	0.57	81.03	5.15	7.93	1.46	14,390	14,390	6.88
A. D.	0.60	38.10	56.48	.015	4.82	0.69	80.59	5.32	7.02	1.56	14,460	14.500	6.80
A. R.	1.61	37.72	55.90	.015	4.77	0.69	79.78	5.38	7.84	1.54	14,310	14,350	6.33
A. D.	0.71	36.87	58.98	.018	3.44	0.58	82.01	5.33	7.16	1.48	14,640	14,710	7.73
A. R.	1.71	36.50	58.38	.018	3.41	0.58	81.19	5.39	7.96	1.47	14,500	14,570	7.14
A. D.	0.74	37.97	57.71	.006	3.58	0.66	82.35	5.31	6.70	1.40	14,740	14,780	8.01
A. R.	1.84	37.54	57.08	.006	3.54	0.65	81.44	5.37	7.61	1.39	14,580	14,620	7.30
A. D.	0.85	36.55	58.93	.006	3.67	0.66	82.45	5.38	6.46	1.38	14,800	14,850	8.13
A. R.	1.58	36.29	58.49	.006	3.64	0.66	81.85	5.42	7.06	1.37	14,690	14,740	7.65
A. D.	0.79	36.12	56.67	.008	6.42	0.71	80.07	5.22	6.21	1.37	14,300	14,430	6.34
A. R.	0.78	35.45	57.47	.008	6.30	0.70	78.57	5.33	7.74	1.36	14,040	14,160	5.59
A. D,	0.76	36.75	54.32	.004	8.17	0.66	78.29	4.87	6.64	1.37	13,940	13,920	5.28
A. R.	2.57	36.08	53.33	.004	8.02	0.65	76.87	4.98	8.12	1.36	13,690	13,670	4.76
A. D.	0.42	33.97	41.53	.007	24.08	0.46	65.41	4.16	4.78	1.11	11,840	11,750	2.26
A. R.	0.85	33.82	41.35	.007	23.98	0.46	65.12	4.19	5.15	1.10	11,790	11,700	2.24
A. D.	0.76	37.36	58.27	.003	3.61	0.59	82.10	5.51	6.80	1.39	14,890	14,860	7.88
A. R.	2.75	36.61	57.10	.003	3.54	0.58	80.46	5.62	8.44	1.36	14,590	14,560	6.71
A. D.	0.71	34.99	56.78	.006	7.52	0.60	78.21	5.20	7.13	1.34	14,050	14,070	5.34
A, R.	2.41	34.39	55.81	.006	7.39	0.59	76.87	5.30	8.53	1.32	13,810	13,830	4.83
A. D.	0.46	37.05	59.31	.005	3.18	0.65	81.85	5.48	7.54	1.30	14,830	14,750	7.63
A. R.	2.16	36.41	58.30	.005	3.13	0.64	80.45	5.58	8.92	1.28	14,580	14,500	6.67
A. D.	0.46	37.60	57.12	.004	4.82	0.63	81.32	5.52	6.34	1.37	14,710	14.790	7.28
A. R.	1.44	37.23	56.56	.004	4.77	0.62	80.52	5.57	7.16	1.36	14,570	14,650	6.75
A. D.	0.74	37.85	57.55	.004	3.86	0.62	81.17	5.58	7.32	1.45	14,870	14,730	7.26
A. R.	2.98	36.99	56.25	.004	3.78	0.60	79.34	5.70	9.16	1.42	14,540	14,400	6.13
A. D.	0.98	36.15	53.66	.006	9.21	0.84	76.63	5.04	6.94	1.34	13,800	13,770	4.74
A, R.	3.04	35.40	52.54	.006	9 02	0.82	75.04	5.17	8.64	1.81	13,520	13,490	4.25
A. D.	0.91	35.22	57.71	.006	6.16	0.67	78.74	5.08	7.91	1.44	13,940	14,020	5.59
A. R.	2.67	34.60	56.68	.006	6.05	0.66	77.85	5.18	9.34	1.42	13,690	13,770	5.03
A. D.	0.96	35.90	58.43	.005	4.71	0.70	80.50	5.18	7.60	1.31	14,440	14,360	6.54
A. R.	3.38	35.03	56.99	.005	4.60	0.69	78.54	5.32	9.57	1.28	14,090	14,010	5.54
A. D.	0.29	37.00	57.74	.007	4.97	0.67	79,77	5.32	7.85	1.42	14,350	14,320	6.22
A. R.	0.78	36.82	57.45	.007	4.95	0.67	79.38	5.34	8.25	1.41	14,280	14,250	6.01
A. D.	0.96	35.14	60.20	.005	3.70	0.66	82.80	5.22	6.29	1.33	14,650	14,830	8.29
A. R.	2.29	34.67	59.39	.005	3.65	0.65	81.69	5.30	7.39	1.32	14,450	14,630	7.40
A. R.	2.52	38.95	54.69	.008	3.84	1.99	....	....	.....	....	......	......	....
A, R.	0.77	38.55	49.69	.005	10.99	0.62	....	....	.....	....	......	......	....
A. R.	1.01	40.38	50.20	.004	8.41	0.63	....	....	.....	....	......	......	....
A. D.	0.90	36.22	57.23	.006	5.65	0 72	79.76	5.11	7.40	1.36	14.258	14,221	6.11
A, R.	1,97	35.79	56.66	.006	5.58	0.71	78.84	5.18	8.34	1.35	14 094	14,058	5.70
A, D.	0.68	36.97	56 60	0.11	5.77	0.62	79.75	5.29	7.12	1.45	14,327	14,353	6.19
A, R.	1,87	36.53	55.90	.011	5.70	0 62	78.72	5.36	8.11	1.43	14,153	14,180	5.70
A. D.	0.70	37.30	57.46	.010	4.54	0.65	80.62	5.28	7.32	1.39	14.517	14,493	6.81
A, R.	2.01	36.81	56.70	.010	4.48	0.65	79.77	5.35	8.37	1.38	14,330	14,307	6.21
A. R.	0.69	40.33	49.57	.006	9.41	0.66	....	....	.....	....	......	......	....
A, R.	1.31	43.67	50.77	.025	4.25	0.85	....	....	.....	....	......	......	....
A. R.	0.92	44.73	46.83	.004	7.52	3.61	....	....	.....	....	......	......	....
A. D.	2.15	34.83	55.08	.003	7.94	0.62	74.56	5.11	10.57	1.20	13,245	13,241	4.03
A, R.	3.09	34.50	54.54	.003	7.87	0.62	73.84	5.22	11.26	1.19	13,118	13,129	3.86
A, R.	0.49	37.62	57.96	.004	3.93	0.62	....	....	.....	....	......	......	....
A. R.	0.81	45.54	49.17	.002	4.48	2 68	....	....	.....	....	......	......	....
A. D.	1.12	42.46	49.84	.007	6.58	1.46	76.69	5.74	8.23	1.30	14,110	14,130	5.18
A. R.	2.06	42.06	49.36	.007	6.52	1.45	75.96	5.79	8.99	1.29	13,980	14,000	4.90

TABLE OF

(Under the heading, "Condition of Sample",

No. on Map II.	Mine.	County.	Horizon.
66	Williamson C. & C. Co. No. 1	Mingo	Williamson, Mining Section
66	Williamson C. & C. Co. No. 1	Mingo	Williamson, Mining Section
67	Williamson C. & C. Co. No. 2	Mingo	Williamson, Mining Section
67	Williamson C. & C. Co. No. 2	Mingo	Williamson, Mining Section
	Average	**Logan & Mingo**	**Williamson, Mining Section**
	Average (Same Samples)	**Logan & Mingo**	**Williamson, Mining Section**
68	Henry Mitchell	Logan	Cedar Grove, Mining Section
69	U. S. Coal & Oil Co. No. 8	Logan	Cedar Grove, Mining Section
69	U. S. Coal & Oil Co. No. 8	Logan	Cedar Grove, Mining Section
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Mining Section
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Mining Section
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Splint
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Splint
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Gas
70	U. S. Coal & Oil Co. No. 7	Logan	Cedar Grove, Gas
71	U. S. Coal & Oil Co. No. 1	Logan	Cedar Grove, Mining Section
71	U. S. Coal & Oil Co. No. 1	Logan	Cedar Grove, Mining Section
72	U. S. Coal & Oil Co. No. 2	Logan	Cedar Grove, Mining Section
72	U. S. Coal & Oil Co. No. 2	Logan	Cedar Grove, Mining Section
73	U. S. Coal & Oil Co. No. 6	Logan	Cedar Grove, Mining Section
73	U. S. Coal & Oil Co. No. 6	Logan	Cedar Grove, Mining Section
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Mining Section
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Mining Section
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Upper Bench
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Upper Bench
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Lower Bench
74	U. S. Coal & Oil Co. No. 9	Logan	Cedar Grove, Lower Bench
75	U. S. Coal & Oil Co. No. 3	Logan	Cedar Grove, Mining Section
75	U. S. Coal & Oil Co. No. 3	Logan	Cedar Grove, Mining Section
76	U. S. Coal & Oil Co. No. 4	Logan	Cedar Grove, Mining Section
76	U. S. Coal & Oil Co. No. 4	Logan	Cedar Grove, Mining Section
77	Cora Coal & Coke Co	Logan	Cedar Grove, Mining Section
77	Cora Coal & Coke Co	Logan	Cedar Grove, Mining Section
78	Shamrock Coal Co. (Litz)	Logan	Cedar Grove, Mining Section
78	Shamrock Coal Co. (Litz)	Logan	Cedar Grove, Mining Section
79	Gay Coal & Coke Co	Logan	Cedar Grove, Mining Section
79	Gay Coal & Coke Co	Logan	Cedar Grove, Mining Section
80	Aracoma Coal Co. No. 2	Logan	Cedar Grove, Mining Section
80	Aracoma Coal Co. No. 2	Logan	Cedar Grove, Mining Section
81	Aracoma Coal Co. No. 1	Logan	Cedar Grove, Mining Section
81	Aracoma Coal Co. No. 1	Logan	Cedar Grove, Mining Section
82	Monitor C. & C. Co. No. 1	Logan	Cedar Grove, Mining Section
82	Monitor C. & C. Co. No. 1	Logan	Cedar Grove, Mining Section
83	Yuma C. & C. Co	Logan	Cedar Grove, Mining Section
83	Yuma C. & C. Co	Logan	Cedar Grove, Mining Section
84	Monitor C. & C. Co. No. 2 (Beechwood)	Logan	Cedar Grove, Mining Section
84	Monitor C. & C. Co. No. 2 (Beechwood)	Logan	Cedar Grove, Mining Section
85	Monitor C. & C. Co. No. 3	Logan	Cedar Grove, Mining Section
85	Monitor C. & C. Co. No. 3	Logan	Cedar Grove, Mining Section
86	Logan Mining Co. (Mona)	Logan	Cedar Grove, Mining Section
86	Logan Mining Co. (Mona)	Logan	Cedar Grove, Mining Section
87	Island Creek Colliery Co	Logan	Cedar Grove, Mining Section
87	Island Creek Colliery Co	Logan	Cedar Grove, Mining Section
87	Island Creek Colliery Co	Logan	Cedar Grove, Cannel
87	Island Creek Colliery Co	Logan	Cedar Grove, Cannel
88	Wood, Cole & Crane	Logan	Cedar Grove, Mining Section
89	Wood, Cole & Crane	Logan	Cedar Grove, Mining Section
90	Deegans Coal Co	Logan	Cedar Grove, Mining Section
90	Deegans Coal Co	Logan	Cedar Grove, Mining Section
91	Crown Coal & Coke Co	Logan	Cedar Grove, Mining Section
91	Crown Coal & Coke Co	Logan	Cedar Grove, Mining Section
92	Avon Coal Co	Logan	Cedar Grove, Mining Section
92	Avon Coal Co	Logan	Cedar Grove, Mining Section
93	Amherst Coal Co	Logan	Cedar Grove, Mining Section
93	Amherst Coal Co	Logan	Cedar Grove, Mining Section
94	Long Flame Coal Co	Logan	Cedar Grove, Mining Section
94	Long Flame Coal Co	Logan	Cedar Grove, Mining Section

COAL ANALYSES.

“A.D.”=air dried, and “A.R.”=as received.)

Condition of Sample.	Proximate.				Common to Both.		Ultimate.				Calorimeter B. T. U. for one lb. of coal.	Calculated B. T. U. for one lb. of coal.	Carbon Divided by Oxygen+Ash.
	Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
A. D.	1.90	36.26	55.85	.023	5.99	1.73	78.55	4.50	8.04	1.19	13,942	13,662	5.60
A. R.	2.27	36.12	55.64	.023	5.97	1.73	78.26	4.54	8.31	1.19	13,891	13,621	5.48
A. D.	2.10	31.40	53.75	.017	12.75	2.64	71.32	4.53	7.76	1.00	12,760	12,650	3.47
A. R.	2.47	31.29	53.54	.017	12.70	2.63	71.06	4.57	8.04	1.00	12,713	12,619	3.42
A. D.	**1.71**	**36.70**	**53.15**	**.016**	**8.44**	**1.94**	**75.53**	**4.92**	**8.01**	**1.16**	**13,604**	**13,481**	**4.59**
A. R.	**2.27**	**36.49**	**52.85**	**.016**	**8.39**	**1.94**	**75.09**	**4.97**	**8.45**	**1.16**	**13,528**	**13,413**	**4.46**
A. R.	1.05	42.62	52.57	.004	3.82	1.22	....	....	.....	....	....	....	....
A. D.	1.13	40.25	53.71	.014	4.91	1.09	79.97	5.07	7.69	1.27	14,370	14,220	6.50
A. R.	3.60	39.24	52.37	.014	4.79	1.06	77.97	5.22	9.72	1.24	14,010	13,870	5.37
A. D.	0.86	40.00	53.74	.013	5.40	1.28	78.58	5.31	8.13	1.30	14,290	14,140	5.89
A. R.	1.88	39.59	53.19	.013	5.34	1.27	77.78	5.37	8.95	1.29	14,150	14,000	5.44
A. D.	0.88	39.65	53.86	.012	5.61	1.13	79.14	5.24	7.60	1.28	14,320	14,220	5.99
A. R.	1.55	39.39	53.49	.012	5.57	1.12	78.61	5.28	8.15	1.27	14,230	14,130	5.73
A. D.	0.91	40.45	54.73	.013	3.91	1.26	79.76	5.48	8.23	1.36	14,540	14,410	6.57
A. R.	1.97	40.01	54.15	.013	3.87	1.25	78.91	5.54	9.08	1.35	14,390	14,260	6.09
A. D.	0.90	34.60	57.27	.009	7.23	1.24	79.92	4.61	5.89	1.11	14,171	14.074	6.08
A. R.	1.09	34.53	57.16	.009	7.22	1.24	79.76	4.63	6.04	1.11	14,143	14.053	6.01
A. D.	1.15	34.00	55.66	.007	9.19	3.76	75.05	4.81	6.15	1.04	13,363	13,574	4.89
A. R.	1.42	33.91	55.50	.007	9.17	3.75	74.85	4.84	6.35	1.04	13,327	13.548	4.82
A. D.	0.48	39.63	55.57	.014	4.32	1.29	79.79	5.50	7.87	1.23	14,600	14,460	6.54
A. R.	1.62	39.18	54.93	.014	4.27	1.28	78.88	5.57	8.78	1.22	14,430	14,300	6.04
A. D.	0.82	40.94	53.89	.013	4.35	1.54	79.59	5.64	7.61	1.27	14,550	14,550	6.65
A. R.	1.68	40.59	53.42	.013	4.31	1.53	78.91	5.69	8.30	1.26	14,430	14,430	6.26
A. D.	0.79	38.54	53.74	.013	6.93	1.37	78.23	4.90	7.30	1.27	14,170	13,910	5.49
A. R.	1.84	38.14	53.16	.013	6.86	1.36	77.40	4.96	8.16	1.26	14,020	13,760	5.15
A. D.	0.90	39.49	56.88	.019	2.73	1.33	82.33	5.55	6.69	1.37	14,830	14,960	8.74
A. R.	2.09	39.02	56.19	.019	2.70	1.31	81.35	5.61	7.67	1.36	14,660	14,790	7.84
A. D.	0.95	39.31	55.01	.011	4.73	1.31	79.86	5.33	7.46	1.31	14,420	14,400	6.55
A. R.	1.86	38.95	54.50	.011	4.69	1.30	79.13	5.38	8.20	1.30	14,280	14,270	6.14
A. D.	0.78	39.57	54.73	.025	4.92	1.33	79.56	5.23	7.59	1.37	14,500	14,290	6.36
A. R.	1.67	39.21	54.24	.025	4.88	1.32	78.84	5.28	8.32	1.36	14,370	14,160	5.97
A. D.	1.24	36.96	57.74	.010	4.06	1.82	79.66	5.46	7.89	1.11	14,389	14,431	6.67
A. R.	1.37	36.91	57.66	.010	4.06	1.82	79.56	5.47	7.98	1.11	14,370	14,416	6.61
A. D.	0.74	39.88	54.43	.006	4.95	1.32	78.96	5.53	7.83	1.41	14,330	14,370	6.18
A. R.	1.73	39.49	53.88	.006	4.90	1.31	78.17	5.59	8.63	1.40	14,190	14,230	5.77
A. D.	1.30	36.70	57.66	.008	4.34	1.55	79.58	4.91	8.43	1.19	14,198	14,048	6.23
A. R.	1.62	36.58	57.47	.008	4.33	1.55	79.33	4.94	8.66	1.19	14,153	13,995	6.11
A. D.	1.10	39.90	54.70	.006	4.30	1.18	79.38	5.41	8.33	1.40	14,460	14,300	6.28
A. R.	2.08	39.50	54.16	.006	4.26	1.17	78.60	5.47	9.11	1.39	14,320	14,160	5.88
A. D.	1.24	39.09	54.29	.006	5.38	1.20	78.43	5.67	7.88	1.44	14,420	14,370	5.91
A. R.	1.84	38.85	53.96	.006	5.35	1.19	77.95	5.71	8.37	1.43	14,330	14,280	5.68
A. D.	1.08	35.62	59.25	.012	4.05	1.99	77.92	5.25	9.67	1.12	14,183	13,919	5.68
A. R.	1.11	35.61	59.23	.012	4.05	1.99	77.90	5.25	9.69	1.12	14,178	13,916	5.60
A. D.	1.02	36.03	58.50	.008	4.45	1.34	79.09	5.39	8.58	1.15	14,377	14,236	6.07
A. R.	1.09	36.00	58.46	.008	4.45	1.34	79.03	5.40	8.63	1.15	14,367	14,229	6.04
A. D.	0.73	41.84	51.52	.004	5.91	1.48	78.61	5.37	7.27	1.36	14,350	14,260	5.96
A. R.	1.76	41.40	50.99	.004	5.85	1.47	77.79	5.42	8.12	1.35	14,200	14,110	5.57
A. D.	0.92	39.64	55.76	.004	3.68	0.93	81.56	5.43	7.00	1.40	14,780	14,720	7.63
A. R.	2.40	39.05	54.92	.004	3.63	0.92	80.35	5.51	8.21	1.38	14,560	14,500	6.79
A. D.	0.69	38.42	56.78	.004	4.11	0.81	80.76	5.72	7.24	1.36	14,740	14,760	7.11
A. R.	1.83	37.98	56.13	.004	4.06	0.80	79.83	5.78	8.18	1.35	14,570	14,590	6.52
A. D.	0.77	39.63	55.51	.007	4.09	1.28	80.30	5.40	7.55	1.38	14,530	14,500	6.90
A. R.	2.02	39.13	54.81	.007	4.04	1.27	79.29	5.47	8.56	1.37	14,350	14,320	6.37
A. D.	0.55	49.10	37.47	.005	12.88	0.48	75.29	6.52	3.89	0.94	14,040	14,100	4.59
A. R.	0.55	49.10	37.47	.005	12.88	0.48	75.29	6.52	3.89	0.94	14,040	14,100	4.59
A. R.	0.73	38.59	56.14	.005	4.54	0.71	....	.....	......	.....	....	....	.....
A. R.	0.62	36.89	57.51	.004	4.98	0.67	....	....	.....	....	....	....	....
A. D.	0.62	36.05	59.20	.007	4.13	1.09	82.45	5.30	5.72	1.31	14,730	14,880	8.37
A. R.	1.72	35.65	58.55	.007	4.08	1.08	81.54	5.36	6.64	1.30	14,570	14,710	7.60
A. D.	0.40	36.79	58.06	.006	4.75	1.43	81.21	5.21	6.07	1.33	14,600	14,630	7.50
A. R.	1.40	36.43	57.47	.006	4.70	1.42	80.40	5.47	6.89	1.32	14,450	14,480	6.94
A. D.	0.64	35.10	58.65	.006	5.61	1.22	81.12	5.25	5.52	1.28	14,630	14,680	7.29
A. R.	1.67	34.74	58.04	.006	5.55	1.21	80.28	5.31	6.38	1.27	14,480	14,530	6.78
A. D.	0.61	35.22	59.28	.006	4.89	0.85	82.32	5.16	5.42	1.36	14,700	14,790	7.98
A. R.	1.45	34.92	58.78	.006	4.85	0.84	81.62	5.21	6.13	1.35	14,580	14,670	7.43
A. D	0.50	34.66	60.60	.018	4.24	0.88	82.61	4.84	6.12	1.31	14,780	14,580	7.97
A. R.	1.52	34.31	59.97	.018	4.20	0.87	81.77	4.90	6.96	1.30	14,630	14,430	7.33

TABLE OF

(Under the heading, "Condition of Sample",

Mine.	County.	Horizon.
Kohinoor Coal & Coke Co.	Logan	Cedar Grove, Mining Section...
Kohinoor Coal & Coke Co.	Logan	Cedar Grove, Mining Section...
United Thacker Coal Co.	Mingo	Cedar Grove, Mining Section...
Marvin Coal Co.	Mingo	Cedar Grove, Mining Section...
Marvin Coal Co.	Mingo	Cedar Grove, Mining Section...
Magnolia Coal & Coke Co.	Mingo	Cedar Grove, Mining Section...
Magnolia Coal & Coke Co.	Mingo	Cedar Grove, Mining Section...
Mate Creek Coal Co.	Mingo	Cedar Grove, Mining Section...
Mate Creek Coal Co.	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Logan)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Red Jacket)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Red Jacket)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Mitchell)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Mitchell)	Mingo	Cedar Grove, Mining Section...
Red Jacket Jr. Coal Co. (Red Jacket Jr.)	Mingo	Cedar Grove, Mining Section...
Red Jacket Jr. Coal Co. (Red Jacket Jr.)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Lynn)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Maritime)	Mingo	Cedar Grove, Mining Section ..
Thacker Coal & Coke Co.	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. (No. 9, No. 2 Plant)	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. (No. 9, No. 2 Plant)	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. (No. 6, No. 2 Plant)	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. (No. 6, No. 2 Plant)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Lick Fork)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Grapevine)	Mingo	Cedar Grove, Mining Section...
Red Jacket Cons. C. & C. Co. (Grapevine)	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. No. 10	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. No. 10	Mingo	Cedar Grove, Mining Section..
Thacker Coal & Coke Co. (No. 14, No. 11 Plant)	Mingo	Cedar Grove, Mining Section...
Thacker Coal & Coke Co. (No 14, No. 11 Plant)	Mingo	Cedar Grove, Mining Section...
Average	**Logan & Mingo**	**Cedar Grove, Mining Section....**
Average (Same Samples)	**Logan & Mingo**	**Cedar Grove, Mining Section....**
Red Jacket Jr. Coal Co. (Red Jacket Jr.)	Mingo	Cedar Grove, Lower Bench, M. S.
Red Jacket Jr. Coal Co. (Red Jacket Jr.)	Mingo	Cedar Grove, Lower Bench, M. S.
Unknown	Mingo	Cedar Grove, Lower Bench, M. S.
Unknown	Mingo	Cedar Grove, Lower Bench, M. S.
Glenalum Coal & Coke Co. (No. 2, No. 1 Plant)	Mingo	Cedar Grove, Lower Bench, M. S.
Glenalum Coal & Coke Co. (No. 2, No. 1 Plant)	Mingo	Cedar Grove, Lower Bench, M. S.
Glenalum Coal & Coke Co. (No. 1, No. 1 Plant)	Mingo	Cedar Grove, Lower Bench, M S.
Glenalum Coal & Coke Co. (No 4, No. 2 Plant)	Mingo	Cedar Grove, Lower Bench, M. S.
Glenalum Coal & Coke Co. (No 4, No. 2 Plant)	Mingo	Cedar Grove, Lower Bench, M. S.
Average (incl. No. 74)	**Logan & Mingo**	**Cedar Grove, Lower Bench, M. S.**
Average (Same Samples)	**Logan & Mingo**	**Cedar Grove, Lower Bench, M. S.**

COAL ANALYSES.

"A.D."=air dried, and "A.R."=as received.)

Condition of Sample.	Proximate.				Common to Both.		Ultin	
	Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen
A. D.	0.69	35.49	59.81	.015	4.01	0.70	83.00	5.32
A. R.	1.38	35.25	59.39	.015	3.98	0.70	82.43	5.35
A. R.	0.87	39.16	55.98	.004	3.99	1.01	....	....
A. D.	1.80	31.46	61.82	.008	4.92	0.63	79.64	4.89
A. R.	2.20	31.34	61.56	.008	4.90	0.63	79.32	4.93
A. D.	0.72	38.71	56.09	.004	4.48	1.02	81.14	5.27
A. R.	2.05	38.19	55.34	.004	4.42	1.01	80.05	5.35
A. D.	1.70	31.78	60.76	.005	5.76	0.83	78.82	4.83
A. R.	1.88	31.72	60.65	.005	5.75	0.83	78.68	4.85
A. R.	0.99	34.78	59.23	.004	5.00	0.90	....	....
A. D.	2.95	34.15	57.90	.004	5.00	0.53	79.10	4.65
A. R.	3.51	33.95	57.57	.004	4.97	0.53	78.64	4.71
A. D.	0.19	38.08	57.18	.015	4.55	0.88	81.40	5.61
A. R.	1.06	37.75	56.68	.015	4.51	0.87	80.69	5.66
A. D.	0.62	38.17	56.19	.013	5.02	1.10	80.79	5.43
A. R.	1.19	37.95	55.87	.013	4.99	1.09	80.33	5.46
A. R.	0.42	34.61	59.32	.0035	5.65	0.93	....	....
A. R.	0.47	35.38	59.48	.002	4.67	1.06	....	....
A. R.	0.41	36.33	58.09	.0025	5.17	0.86	....	....
A. D.	0.66	37.53	56.67	.027	5.14	0.70	81.14	5.35
A. R.	1.61	37.17	56.13	.027	5.09	0.69	80.36	5.40
A. D.	0.77	37.13	56.03	.006	6.07	0.91	79.80	5.17
A. R.	1.69	36.79	55.51	.006	6.01	0.90	79.06	5.22
A. R.	0.37	34.37	60.63	.013	4.63	1.13	....	....
A. D.	2.00	32.48	56.74	.006	8.78	0.93	74.40	4.55
A. R	2.38	32.36	56.51	.006	8.75	0.93	74.12	4.59
A. D.	1.10	31.22	61.12	.021	6.56	0.79	80.03	5.00
A. R.	1.38	31.13	60.95	0.21	6.54	0.79	79.81	5.03
A. D.	0.71	38.43	55.88	.076	4.98	1.20	80.87	5.39
A. R.	1.50	38.12	55.44	.076	4.94	1.19	80.23	5.44
A. D.	**0.96**	**37.07**	**56.88**	**.012**	**5.09**	**1.21**	**79.90**	**5.23**
A. R.	**1.76**	**36.76**	**56.43**	**.012**	**5.05**	**1.20**	**79.26**	**5.28**
A. D.	0.49	36.19	59.63	.003	3.69	0.69	80.75	5.56
A. R.	1.39	35.87	59.08	.003	3.66	0.68	80.03	5.61
A. R.	0.63	35.42	58.35	.004	5.60	0.77	....	....
A. R.	0.62	34.61	59.39	.046	5.38	0.64	....	....
A. D.	0.91	36.19	57.90	.006	5.00	0.74	81.10	5.17
A. R.	1.83	35.85	57.37	.006	4.95	0.73	80.35	5.22
A. R.	0.45	32.36	61.25	.0115	5.94	0.67	....	....
A. D.	0.77	34.79	60.24	.008	4.20	0.71	82.35	5.30
A. R.	1.92	34.39	59.54	.008	4.15	0.70	81.39	5.37
A. D.	**0.77**	**36.67**	**58.66**	**.009**	**3.90**	**0.87**	**81.63**	**5.4[illegible]**
A. R.	**1.81**	**36.28**	**58.04**	**.009**	**3.87**	**0.85**	**80.78**	**5.45**

TABLE OF

(Under the heading, "Condition of Sample",

No. on Map II.	Mine.	County.	Horizon.
119	Wm. Tomblin	Logan	Alma, Mining Section
120	George Bryant	Logan	Alma, Mining Section
121	Black Hawk Colliery Co.	Logan	Alma, Mining Section
121	Black Hawk Colliery Co.	Logan	Alma, Mining Section
122	Stone Branch C. & C. Co.	Logan	Alma, Mining Section
122	Stone Branch C. & C. Co.	Logan	Alma, Mining Section
123	Guyandot Coal Co.	Logan	Alma, Mining Section
124	E. R. Johnson Coal Mining Co.	Logan	Alma, Mining Section
124	E. R. Johnson Coal Mining Co.	Logan	Alma, Mining Section
125	Draper C. & C. Co. (Draper)	Logan	Alma, Mining Section
125	Draper C. & C. Co. (Draper)	Logan	Alma, Mining Section
126	H. T. Wilson Coal Co.	Logan	Alma, Mining Section
126	H. T. Wilson Coal Co.	Logan	Alma, Mining Section
127	Mingo Mining Co.	Mingo	Alma, Mining Section
128	Merrimac Coal Co.	Mingo	Alma, Mining Section
128	Merrimac Coal Co.	Mingo	Alma, Mining Section
129	Marvin Coal Co.	Mingo	Alma, Mining Section
129	Marvin Coal Co.	Mingo	Alma, Mining Section
130	Mate Creek Coal Co.	Mingo	Alma, Mining Section
130	Mate Creek Coal Co.	Mingo	Alma, Mining Section
131	Judge Sancel	Mingo	Alma, Mining Section
	Average	**Logan & Mingo**	**Alma, Mining Section**
	Average (Same Samples)	**Logan & Mingo**	**Alma, Mining Section**
132	Minerva Dempsey	Logan	Campbell Creek, Mining Section
133	Rich Creek Coal Co. (Wilburn)	Logan	Campbell Creek, Mining Section
133	Rich Creek Coal Co. (Wilburn)	Logan	Campbell Creek, Mining Section
134	Manbar Coal Co.	Logan	Campbell Creek, Mining Section
134	Manbar Coal Co.	Logan	Campbell Creek, Mining Section
135	Logan Mining Co. (Earling)	Logan	Campbell Creek, Mining Section
135	Logan Mining Co. (Earling)	Logan	Campbell Creek, Mining Section
136	Summers Coal Co.	Logan	Campbell Creek, Mining Section
136	Summers Coal Co.	Logan	Campbell Creek, Mining Section
137	Avon Coal Co.	Logan	Campbell Creek, Mining Section
137	Avon Coal Co.	Logan	Campbell Creek, Mining Section
138	Huddleson Coal Co.	Logan	Campbell Creek, Mining Section
138	Huddleson Coal Co.	Logan	Campbell Creek, Mining Section
139	Virginia-Buffalo Coal Co. No. 2	Logan	Campbell Creek, Mining Section
139	Virginia-Buffalo Coal Co. No. 2	Logan	Campbell Creek, Mining Section
140	Unknown	Logan	Campbell Creek, Mining Section
141	Grey Eagle Coal Co.	Mingo	Campbell Creek, Mining Section
141	Grey Eagle Coal Co.	Mingo	Campbell Creek, Mining Section
141A	Rawl Coal & Coke Co.	Mingo	Campbell Creek, Mining Section
141A	Rawl Coal & Coke Co.	Mingo	Campbell Creek, Mining Section
142	War Eagle Coal Co. (Star)	Mingo	Campbell Creek, Mining Section
142	War Eagle Coal Co. (Star)	Mingo	Campbell Creek, Mining Section
143	Margaret Mining Co.	Mingo	Campbell Creek, Mining Section
143	Margaret Mining Co.	Mingo	Campbell Creek, Mining Section
144	War Eagle Coal Co. (War Eagle)	Mingo	Campbell Creek, Mining Section
144	War Eagle Coal Co. (War Eagle)	Mingo	Campbell Creek, Mining Section
	Average	**Logan & Mingo**	**Campbell Creek, Mining Section**
	Average (Same Samples)	**Logan & Mingo**	**Campbell Creek, Mining Section**
145	Unknown	Logan	Eagle, Mining Section
146	United Thacker Coal Co.	Mingo	Eagle, Mining Section
147	Alexander Stafford	Mingo	Eagle, Mining Section
148	Margaret Mining Co. (Margaret)	Mingo	Eagle, Mining Section
148	Margaret Mining Co. (Margaret)	Mingo	Eagle, Mining Section
149	War Eagle Coal Co. (Mephisto)	Mingo	Eagle, Mining Section
149	War Eagle Coal Co. (Mephisto)	Mingo	Eagle, Mining Section
150	War Eagle Coal Co. (Pappoose)	Mingo	Eagle, Mining Section
150	War Eagle Coal Co. (Pappoose)	Mingo	Eagle, Mining Section
	Average	**Logan & Mingo**	**Eagle, Mining Section**
	Average (Same Samples)	**Logan & Mingo**	**Eagle, Mining Section**
151	Majestic Colliery Co. (Cedar)	Mingo	Cedar, Mining Section
151	Majestic Colliery Co. (Cedar)	Mingo	Cedar, Mining Section
152	Unknown	Logan	Lower War Eagle, Min. Sect.
153	Unknown	Mingo	Lower War Eagle, Min. Sect.

COAL ANALYSES.

"A.D."=air dried, and "A.R."=as received.)

Condition of Sample.	Proximate.				Common to Both.		Proximate.				Calorimeter B. T. U. for one lb. of coal.	Calculated B. T. U. for one lb. of coal.	Carbon Divided by Oxygen+Ash.
	Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen			
A. R.	1.90	42.01	51.48	.005	4.61	0.78	....	....	.....	....	....	....	...
A. R.	0.33	42.21	53.16	.001	4.30	1.43	....	....	.....	....	....	....	...
A. D.	1.68	36.22	54.93	.014	7.17	1.91	74.67	4.87	10.16	1.22	13,561	13,170	4.3
A. R.	1.86	36.15	54.83	.014	7.16	1.91	74.54	4.89	10.28	1.22	13,537	13,151	4.2
A. D.	1.86	35.74	56.53	.013	5.87	2.14	75.20	4.92	10.80	1.07	13,516	13,238	4.5
A. R.	1.96	35.71	56.46	.013	5.87	2.14	75.13	4.93	10.86	1.07	13,503	13,226	4.4
A. R.	1.22	43.33	50.99	.010	4.46	1.57	....	....	.....	....	....	....	...
A. D.	1.10	41.18	52.61	.004	5.11	1.99	78.72	5.67	7.19	1.32	14,400	14,490	6.4
A. R.	1.85	40.87	52.21	.004	5.07	1.98	78.12	5.72	7.80	1.31	14,290	14,380	6.0
A. D.	1.20	35.40	56.17	.009	7.23	1.73	75.44	4.80	9.64	1.16	13,787	13,275	4.4
A. R.	1.53	35.29	55.97	.009	7.21	1.73	75.19	4.84	9.87	1.16	13,753	13,236	4.4
A. D.	1.50	32.60	54.83	.008	11.07	0.97	74.73	4.72	7.38	1.13	13,248	13,267	4.0
A. R.	1.53	32.59	54.81	.008	11.07	0.97	74.71	4.72	7.40	1.13	13,245	13,264	4.0
A. R.	0.62	35.24	57.43	.003	6.71	0.55	....	....	.....	....	....	....	...
A. D.	1.75	30.15	61.99	.006	6.11	0.55	78.77	4.98	8.32	1.27	14,061	13,921	5.4
A. R.	2.19	30.02	61.70	.006	6.09	0.55	78.42	5.03	8.64	1.27	13,999	13,878	5.3
A. D.	1.30	33.36	61.78	.006	3.56	0.57	80.57	5.39	8.68	1.23	14,512	14,414	6.5
A. R.	1.59	33.26	61.60	.006	3.55	0.57	80.34	5.42	8.89	1.23	14,470	14,380	8.5
A. D.	1.25	31.09	62.10	.009	5.56	0.49	81.75	4.39	6.64	1.17	14,177	14,119	6.7
A. R.	1.75	30.94	61.78	.009	5.53	0.49	81.34	4.45	7.02	1.17	14,106	14,083	6.4
A. R.	0.58	35.86	61.21	.038	2.35	0.60	....	....	.....	....	....	....	...
A. D.	**1.45**	**34.47**	**57.62**	**.008**	**6.46**	**1.29**	**77.46**	**4.97**	**8.60**	**1.20**	**13,906**	**13,737**	**5.1**
A. R.	**1.79**	**34.36**	**57.42**	**.008**	**6.44**	**1.29**	**77.22**	**5.00**	**8.65**	**1.20**	**13,863**	**13,700**	**5.0**
A. R.	1.57	39.99	56.86	.006	1.58	0.71	....	....	.....	....	....	....	...
A. D.	0.82	35.95	58.54	.004	4.69	0.71	81.01	5.12	7.20	1.27	14,590	14,430	6.8
A. R.	1.65	35.65	58.05	.004	4.65	0.70	80.33	5.17	7.89	1.26	14,470	14,310	6.4
A. D.	1.00	34.33	59.74	.004	4.93	0.69	81.43	5.11	6.58	1.26	14,560	14,530	7.0
A. R.	1.77	34.06	59.28	.004	4.89	0.69	80.79	5.15	7.23	1.25	14,450	14,420	6.6
A. D.	0.88	36.04	58.53	.008	4.55	0.74	82.10	5.39	5.90	1.32	14,660	14,850	7.8
A. R.	1.86	35.68	57.95	.008	4.51	0.73	81.29	5.45	6.71	1.31	14,520	14,710	7.2
A. D.	0.74	34.84	60.36	.004	4.06	0.67	83.00	5.28	5.68	1.31	14,730	14,890	8.5
A. R.	0.99	34.75	60.21	.004	4.05	0.67	82.79	5.30	5.88	1.31	14,700	14,860	8.3
A. D.	0.64	34.20	60.62	.004	4.54	0.66	82.04	5.22	6.27	1.27	14,650	14,710	7.5
A. R.	1.53	33.90	60.07	.004	4.50	0.66	81.32	5.27	6.99	1.26	14,520	14,580	7.0
A. D.	0.69	31.96	60.27	.014	7.08	0.60	80.14	4.92	5.98	1.28	14,230	14,260	6.1
A. R.	1.73	31.63	59.63	.014	7.01	0.59	79.30	4.98	6.85	1.27	14,080	14,110	5.7
A. D.	0.74	33.23	61.11	.007	4.92	0.60	81.11	5.17	6.97	1.23	14,670	14,490	6.8
A. R.	1.66	32.93	60.53	.007	4.88	0.59	80.36	5.22	7.73	1.22	14,540	14,360	6.3
A. R.	0.13	35.69	60.96	.003	3.22	0.76	....	....	.....	....	....	....	...
A. D.	1.90	34.30	55.93	.004	7.87	1.74	73.74	4.53	10.94	1.18	13,182	12,755	3.9
A. R.	2.46	34.11	55.60	.004	7.83	1.73	73.32	4.59	11.35	1.18	13,107	12,801	3.8
A. D.	1.60	29.90	65.58	.004	2.92	0.54	81.39	5.03	9.08	1.04	14,636	14,278	6.7
A. R.	1.99	29.78	65.32	.004	2.91	0.54	81.07	5.07	9.37	1.04	14,579	14,232	6.6
A. D.	1.45	27.59	66.17	.005	4.79	0.67	81.90	5.21	6.29	1.14	14,656	14,680	7.3
A. R.	2.02	27.44	65.78	.005	4.76	0.67	81.44	5.27	6.72	1.14	14,573	14,618	7.0
A. D.	1.30	28.72	64.36	.005	5.62	0.55	81.47	5.21	5.93	1.22	14.461	14,447	7.0
A. R.	1.31	28.72	64.35	.005	5.62	0.55	81.46	5.21	5.94	1.22	14,460	14,445	7.0
A. D.	1.40	27.80	65.63	.008	5.17	0.49	81.41	4.74	7.01	1.18	14,141	14,256	6.6
A. R.	1.70	27.72	65.42	.008	5.16	0.49	81.17	4.77	7.23	1.18	14,099	14,225	6.5
A. D.	**1.09**	**31.41**	**61.40**	**.006**	**5.10**	**0.72**	**80.90**	**5.06**	**6.99**	**1.23**	**14,431**	**14,381**	**6.6**
A. R.	**1.72**	**32.90**	**61.02**	**.006**	**5.06**	**0.72**	**80.39**	**5.12**	**7.49**	**1.22**	**14,342**	**14,306**	**6.4**
A. R.	0.40	34.50	51.97	.007	13.13	4.70	....	....	.....	....	....	....	...
A. R.	0.18	32.65	60.63	.083	6.54	1.07	....	....	.....	....	....	....	...
A. R.	0.20	34.46	59.52	.020	5.82	1.06	....	....	.....	....	....	....	...
A. D.	1.20	28.22	63.89	.007	6.69	1.54	81.27	4.49	4.78	1.23	14,129	14,297	7.0
A. R.	1.38	28.17	63.77	.007	6.68	1.54	81.12	4.51	4.92	1.23	14,104	14,279	6.9
A. D.	1.30	28.96	65.55	.006	4.19	1.32	82.68	5.19	5.35	1.27	14,871	14,882	8.6
A. R.	1.66	28.86	65.30	.006	4.18	1.32	82.38	5.23	5.62	1.27	14,818	14,844	8.4
A. D.	1.55	28.19	66.23	.004	4.03	1.42	81.87	4.97	6.46	1.25	14,586	14,546	7.8
A. R.	1.75	28.14	66.09	.004	4.02	1.42	81.71	4.99	6.61	1.25	14,557	14,522	7.6
A. D.	**1.35**	**28.46**	**65.22**	**.006**	**4.97**	**1.43**	**81.94**	**4.88**	**5.53**	**1.25**	**14,529**	**14,575**	**7.8**
A. R.	**1.60**	**28.39**	**65.05**	**.006**	**4.96**	**1.43**	**81.74**	**4.91**	**5.71**	**1.25**	**14,493**	**14,548**	**7.6**
A. D.	1.40	28.92	61.70	.010	7.98	1.14	76.23	5.09	8.29	1.27	13,965	13,648	4.6
A. R.	1.75	28.82	61.48	.010	7.95	1.14	75.97	5.13	8.54	1.27	13,916	13,613	4.6
A. R.	0.34	35.21	60.85	.003	3.60	0.79	....	....	.....	....	....	....	...
A. R.	0.23	37.05	58.66	.031	4.06	1.07	....	....	.....	....	....	....	...

Average Proximate Analyses "A.R." Samples.

County.	Horizon.	Moisture.	Volatile Matter.	Fixed Carbon.	Phosphorus.	Ash.	Sulphur.
Logan	Upper Kittanning, Mining Section	0.94	39.91	51.11	.004	8.04	0.74
Mingo	No. 5 Block, Mining Section	1.81	38.82	47.59	.008	11.78	0.77
Mingo	Stockton, Mining Section	1.46	34.99	49.76	.003	13.79	0.60
Logan and Mingo	Coalburg, Mining Section	2.17	36.44	52.74	.006	8.65	0.80
Logan	Little Coalburg, Mining Section	2.00	40.71	54.06	.004	3.23	0.88
Logan and Mingo	Buffalo Creek, Mining Section	2.67	35.99	56.25	.005	5.09	0.75
Logan and Mingo	Winifrede, Mining Section	1.26	39.77	53.74	.005	5.23	0.68
Mingo	Chilton "A," Cannel	0.39	58.16	27.46	.008	13.99	0.66
Mingo	Chilton "A," Mining Section	1.52	40.17	46.90	.006	11.41	0.66
Logan and Mingo	Chilton, Mining Section	1.91	36.21	56.04	.006	5.84	0.75
Logan	Chilton, Upper Bench	1.87	36.53	55.90	.011	5.70	0.62
Logan	Chilton, Lower Bench	2.01	36.81	56.70	.010	4.48	0.65
Logan	Chilton, Cannel	0.85	33.82	41.35	.007	23.98	0.46
Logan and Mingo	Dingess, Mining Section	1.50	40.81	50.43	.009	7.26	1.43
Logan and Mingo	Williamson, Mining Section	1.62	38.53	53.13	.011	6.72	1.82
Logan and Mingo	Cedar Grove, Mining Section	1.54	36.80	56.67	.010	4.99	1.15
Logan and Mingo	Cedar Grove, "Splint"	1.55	39.39	53.49	.012	5.57	1.12
Logan and Mingo	Cedar Grove, "Gas"	1.97	40.01	54.15	.013	3.87	1.25
Logan and Mingo	Cedar Grove, Upper Bench	1.84	38.14	53.16	.013	6.86	1.36
Logan and Mingo	Cedar Grove, Lower Bench	1.27	35.36	58.74	.014	4.63	0.79
Logan and Mingo	Alma, Mining Section	1.46	36.42	56.43	.010	5.69	1.17
Logan and Mingo	Campbell Creek (No. 2 Gas), Mining Section	1.60	33.00	60.72	.007	4.68	0.72
Logan and Mingo	Eagle, Mining Section	0.93	31.13	61.21	.021	6.73	1.85
Mingo	Bens Creek, Mining Section	0.84	36.68	55.72	.006	6.76	3.30
Mingo	Cedar, Mining Section	1.75	28.82	61.48	.010	7.95	1.14
Logan and Mingo	Lower War Eagle, Mining Section	0.28	36.13	59.76	.017	3.83	0.93

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.

No. on Map II.	Sample Number.	Name of Owner.	Page.
1	2R	Lewis Maynard	95
2	20R	Jack Williams	336
3	11R	United Thacker Coal Co	345
4	4G	Boone County Coal Corporation	353
5	6G	Paris Jarrold	354
6	861H	Unknown	352
7	9R	Wood, Cole & Crane	355
8	10R	Thomas Curry	355
9	21R	Jefferson Adkins	359
10	Vol. II(A), page 411.	Mingo Block Coal Co	362
11	Vol. II(A), page 410.	Mingo Block Coal Co	373
12	34G	Big Block Coal Co	370
13	81G	J. R. Shanklin Coal Co	368
14	16G	Howard Jr. Colliery Co. (Howard Jr.)	376
15	14G	Buffalo Collieries Co	377
16	15G	Howard Collieries Co. (Howard)	377
17	17G	Sycamore Coal Co. (Cinderella)	379
18	30G	Crystal Block Coal & Coke Co	379
19	5G	Boone County Coal Corporation	140
20	Vol. II(A), page 415.	Culross Coal Co	384
21	Vol. II(A), page 410.	Mary Helen Coal Co	385
22	Vol. II(A), page 410.	Howard Jr. Colliery Co. (Howard Jr.)	385
23	Vol. II(A), page 410.	Buffalo Collieries Co	386
24	Vol. II(A), page 410.	Howard Collieries Co. (Frederick)	386
25	Vol. II(A), page 410.	Howard Collieries Co. (Howard)	387
26	32G	E. L. Sternberger Coal Co	388
27	18G	Sycamore Coal Co. No. 2	388
28	31G	Crystal Block Coal & Coke Co	389
29	19G	Williamson Coal & Coke Co. No. 3	390
30	7G	Paris Jarrold Heirs	394
31	16R	John Deskins	398
32	13R	Melvin Justice	399
33	18R	H. C. Closterman	405
34	17R	Hiram Stafford	404
35	35G	E. R. Johnson Coal Mining Co	412
36	40G	Sunbeam Coal Co	414
37	Vol. II(A), page 381.	Fort Branch Coal Co	414
38	Vol. II(A), page 382.	Logan Mining Co. (Wanda)	415
39	Vol. II(A), page 382.	Rex Coal & Coke Co	415

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.—Continued.

No. on Map II.	Sample Number.	Name of Owner.	Page.
40	Vol. II(A), page 381.	Logan Mining Co. (Logan)	416
41	43G	Logan Mining Co. (Manitoba)	416
42	Vol. II(A), page 381.	Ethel Coal Co	417
43	42G	Freeze Fork Coal Co	418
44	41G	Georges Creek Coal Co	419
45	51G	Argyle Coal Co	420
46	50G	Paragon Coal Co	420
47	49G	McGregor Coal Co	421
48	76G	Sovereign Coal Co	423
49	74G	D. C. Thomas Coal Co. (Grace)	424
50	73G	Upperman Coal Co	425
51	75G	Spruce Valley Coal Co	425
52	77G	Spruce Bend Coal Co	428
53	78G	Coal River Coal & Coke Co	429
54	79G	Mifflin Coal Co	430
55	80G	Coal Valley Mining Co	431
56	59G	Amherst Coal Co	435
57	15R	George Hannah	448
58	5R	Evan Akers	455
59	4R	John Vance	441
60	6R	P. J. Dingess	469
61	3R	Harvey Dingess	468
62	2G	Guyandot Land Association	476
62A	Vol. II(A), page 406.	Marion Timbering Co	478
63	862H	Unknown	493
64	14R	L. D. Starr	500
65	33G	Mary Helen Coal Co	503
66	Vol. II(A), page 411.	Williamson Coal & Coke Co. No. 1	506
67	Vol. II(A), page 412.	Williamson Coal & Coke Co. No. 2	507
68	1G	Henry Mitchell	517
69	67G	U. S. Coal & Oil Co. No. 8	518
70	68G	U. S. Coal & Oil Co. No. 7	519
71	Vol. II(A), page 385.	U. S. Coal & Oil Co. No. 1	519
72	Vol. II(A), page 386.	U. S. Coal & Oil Co. No. 2	520
73	69G	U. S. Coal & Oil Co. No. 6	520
74	70G	U. S. Coal & Oil Co. No. 9	521
75	71G	U. S. Coal & Oil Co. No. 3	521
76	72G	U. S. Coal & Oil Co. No. 4	522
77	Vol. II(A), page 384.	Cora Coal & Coke Co	523
78	48G	Shamrock Coal & Coke Co. (Litz)	523
79	Vol. II(A), page 383.	Gay Coal & Coke Co	524

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.—Continued.

No. on Map II.	Sample Number.	Name of Owner.	Page.
80	37G	Aracoma Coal Co. No. 2	524
81	38G	Aracoma Coal Co. No. 1	525
82	Vol. II(A), page 383.	Monitor Coal & Coke Co. No. 1	526
83	Vol. II(A), page 384.	Yuma Coal & Coke Co	526
84	45G	Monitor Coal & Coke Co. No. 2 (Beechwood)	527
85	44G	Monitor Coal & Coke Co. No. 3	527
86	47G	Logan Mining Co. (Mona)	528
87	46G	Island Creek Colliery Co	529
88	8R	Wood, Cole & Crane	532
89	8G	Wood, Cole & Crane	533
90	52G	Deegans Coal Co	539
91	53G	Crown Coal & Coke Co	540
92	56G	Avon Coal Co	540
93	60G	Amherst Coal Co	541
94	61G	Long Flame Coal Co	542
95	62G	Kohinoor Coal & Coke Co	542
96	12R	United Thacker Coal Co	551
97	Vol. II(A), page 412.	Marvin Coal Co	557
98	29G	Magnolia Coal & Coke Co	557
99	Vol. II(A), page 413.	Mate Creek Coal Co	558
100	Vol. II. page 547.	Red Jacket Cons. Coal & Coke Co. (Logan)	558
101	Vol. II. page 547.	Red Jacket Cons. Coal & Coke Co. (Red Jacket)	558
102	28G	Red Jacket Cons. Coal & Coke Co. (Mitchell)	559
103	26G	Red Jacket Cons. Coal & Coke Co. (Red Jacket Jr.)	559
104	Vol. II, page 547.	Red Jacket Cons. Coal & Coke Co. (Lynn)	561
105	Vol. II, page 545.	Red Jacket Cons. Coal & Coke Co. (Maritime)	561
106	Vol. II(A), page 408.	Thacker Coal & Coke Co	562
107	20G	Thacker Coal & Coke Co. (Mine No. 9 of No. 2 Plant)	563
108	21G	Thacker Coal & Coke Co. (Mine No. 6 of No. 2 Plant)	563
109	Vol. II, page 545.	Red Jacket Cons. Coal & Coke Co. (Lick Fork)	564
110	Vol. II, page 546.	Red Jacket Cons. Coal & Coke Co. (Grapevine)	565
111	Vol. II(A), page 413.	Thacker Coal & Coke Co. No. 10	565

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.—Continued.

No. on Map II.	Sample Number.	Name of Owner.	Page.
112	22G	Thacker Coal & Coke Co. (Mine No. 14 of No. 11 Plant)	566
113	27G	Red Jacket Jr. Coal Co. (Red Jacket Jr.)	579
114	865H	Unknown	580
115	13G	Unknown	582
116	24G	Glenalum Coal & Coke Co. (Mine No. 2 of No. 1 Plant)	583
117	Vol II, page 548.	Glenalum Coal & Coke Co. (Mine No. 1 of No. 2 Plant)	583
118	25G	Glenalum Coal & Coke Co. (Mine No. 4 of No. 2 Plant)	584
119	3G	William Tomblin	592
120	1R	George Bryant	593
121	Vol. II(A), page 379.	Black Hawk Colliery Co	596
122	Vol. II(A), page 379.	Stone Branch Coal & Coke Co	600
123	39G	Guyandot Coal Co	600
124	36G	E. R. Johnson Coal Mining Co	607
125	Vol. II(A), page 352.	Draper Coal & Coke Co	608
126	Vol. II(A), page 348.	H. T. Wilson Coal Co	608
127	Vol. II(A), page 404.	Mingo Mining Co	619
128	Vol. II(A), page 404.	White Star Mining Co	619
129	Vol. II(A), page 406.	Marvin Coal Co	621
130	Vol. II(A), page 406.	Mate Creek Coal Co	622
131	10G	Judge Sancel	627
132	7R	Minerva Dempsey	631
133	65G	Rich Creek Coal Co. (Wilburn)	645
134	66G	Manbar Coal Co	646
135	63G	Logan Mining Co. (Earling)	646
136	54G	Summers Coal Co	649
137	57G	Avon Coal Co	650
138	55G	Huddleson Coal Co	651
139	58G	Virginia-Buffalo Coal Co. No. 2	652
140	863H	Unknown	655
141	Vol. II(A), page 402.	Grey Eagle Coal Co	658
141A	Vol. II(A), page 403.	Rawl Coal & Coke Co	661
142	Vol. II(A), page 330.	War Eagle Coal Co	666
143	Vol. II(A), page 347.	Margaret Mining Co	666

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.—Continued.

No. on Map II.	Sample Number.	Name of Owner.	Page.
144	Vol. II(A), page 347.	War Eagle Coal Co. (War Eagle).......	667
145	864H	Unknown	675
146	11G	United Thacker Coal Co................	680
147	9G	Alexander Stafford....................	680
148	Vol. II(A), page 347.	Margaret Mining Co. (Margaret).......	682
149	Vol. II(A), page 347.	War Eagle Coal Co. (Mephisto)........	683
150	Vol. II(A), page 347.	War Eagle Coal Co. (Pappoose)........	683
151	Vol. II(A), page 347.	Majestic Colliery Co. (Cedar)..........	693
152	866H	Unknown	697
153	12G	Unknown	699

CHAPTER IX.

CLAY, ROAD MATERIAL, BUILDING STONE, WATER POWER, MINERAL WATERS AND FORESTS.

CLAYS AND CLAY INDUSTRY.

Present Development.

Brick Plants.

Red Brick Company.—The Red Brick Company, located three-fourths mile west of Williamson, is the only brick plant within the two counties. According to information supplied Hennen by T. B. Jones, Manager, the Company manufactures commercial building brick exclusively, which sell for $8.00 per thousand, most of the product being used in Williamson.

The equipment includes an American Stock Brick Machine, with a daily capacity of 40,000, the present output being 15,000. The brick are dried in 8 American Steam Tunnel Driers, the drying process requiring 36 hours, and burned in 4 rectangular up-draft kilns, two of which are of 150,000 and two of 100,000 capacity, the burning process requiring 10 days Nut and slack coal from local mines are used for fuel. It is the intention to increase the drying and burning capacity to that of the brick machine to care for additional trade which the present equipment can not supply.

The **clay pit** is in the alluvial flood plain deposit along Tug Fork, being excavated 12 feet deep and about 150 feet long. The elevation at the base of the pit is 650′ B., 17 feet below railroad grade. According to Mr. Jones, a well drilled near the pit showed a total thickness of 24 feet of clay, the bottom of which is near the present level of Tug Fork. The clay burns to a deep red color in the kilns.

A sample (No. 867H) of the clay, collected by Hennen, shows the following analysis, according to Hite and Krak:

	Per cent.
Silica (Si O_2)	70.58
Ferric Iron (Fe_2O_3)	3.14
Alumina (Al_2O_3)	14.24
Lime (CaO)	0.37
Magnesia (MgO)	0.86
Sodium (Na_2O)	0.94
Potassium (K_2O)	2.56
Titanium (TiO_2)	0.49
Phosphoric Acid (P_2O_5)	0.22
Moisture	1.34
Loss on Ignition	5.03
Total	99.77

Available Clay.

Transported Clay.

Along the flood plains of Guyandot River in Logan County and Tug Fork of Big Sandy River in Mingo, there is a large amount of clay and sand transported to its present position by the erosive work of the rivers and their tributary streams. Inasmuch as the deposits are numerous along both streams, no attempt is made to name them in detail, but reference is made to Map II, which shows the alluvial deposits in yellow, the most suitable locations for brick plants being at the point where the deposits are widest, making extensive beds of clay and suitable ground for buildings and equipment. In view of the fact that these flood plain deposits are all derived from the silicious rocks of the Kanawha, New River, and Pocahontas Series, it is possible that, in many places, they will be found lacking in the proper amount of aluminous matter necessary for successful brick manufacture, so that careful investigation of this feature should be made before building plants.

Residual Clay.

Residual clay, which is derived from weathered rocks and not transported from its original location, is almost entirely lacking in the two counties and may be entirely disregarded as a commercial asset.

Stratified Shales.

Stratified shales, lying between the great sandstone ledges of the Kanawha Series that form the surface rock system of the two counties, are numerous. Many of these shale strata, however, are entirely too silicious to be available for brick or tile manufacture, as the percentage of alumina would be too low.

In western Mingo County, a dark bed of shale frequently appears just below the Dingess Limestone, being 5 to 15 feet thick, which would probably burn into good building or paving brick, the percentage of iron being large enough to make the brick burn red. The deposits of this shale may be located easily from the outcrop of the Dingess Limestone, shown in red on Map II.

A measurement of this shale was made as follows by Reger along the Norfolk and Western Railway grade just south of Middle Burning Creek and one mile southeast of Kermit:

		Feet	Inches
1.	Sandstone, massive........................		
2.	Shale, dark, with iron ore nodules..........	20	0
3.	Coal, slaty, Williamson, to railroad grade (625′ B.)...............................		

A sample (No. 19R) was collected from No. 2 of section, the iron ore nodules being discarded, the analysis of which is as follows, according to Hite and Krak:

	Per cent.
Silica (SiO_2)......................................	55.26
Ferric Iron (Fe_2O_3)..................................	6.61
Alumina (Al_2O_3)......................................	22.07
Lime (CaO)...	0.48
Magnesia (MgO).....................................	1.79
Sodium (Na_2O)......................................	0.60
Potassium (K_2O).....................................	4.41
Titanium (TiO_2)......................................	0.42
Phosphoric Acid (P_2O_5)................................	0.37
Moisture	0.93
Loss on Ignition......................................	7.76
Total..	100.70

The best stratified bed observed for brick making is the Eagle Shale, which in western Logan County along the Guyandot River belongs about 300 feet below the Campbell Creek (No. 2 Gas) Coal, while in Stafford District, Mingo County, this interval has increased to more than 400 feet. The occurrence of this shale in reference to the other formations of the Kanawha Series has been described in detail in Chapter VI.

At the mouth of Crawley Creek, Chapmanville District, Logan County, 1.2 miles west of Chapmanville, the following measurement of the Eagle Shale was made by Reger on the land of **R. E. Lough:**

	Feet	Inches
1. Sandstone, massive (base 706′ B.)	40	0
2. Shale, dark, with large limestone "turtle-back" concretions	85	0
3. Concealed to river	20	0

A sample (No. 22R) was collected from No. 2 of section, the limestone concretions being discarded, which shows the following analysis:

	Per cent.
Silica (SiO_2)	58.86
Ferric Iron (Fe_2O_3)	7.30
Alumina (Al_2O_3)	19.09
Lime (CaO)	0.80
Magnesia (MgO)	1.93
Sodium (Na_2O)	0.79
Potassium (K_2O)	3.64
Titanium (TiO_2)	0.76
Phosphoric Acid (P_2O_5)	0.39
Moisture	1.00
Loss on Ignition	6.20
Total	100.76

The location of this outcrop is favorable for the establishment of a plant for brick making, as the shale is available in unlimited amount, being just above drainage for several miles up Crawley Creek. If so desired, it could be mined directly into the hill, as the great sandstone above it would form an excellent roof. The limestone concretions noted in the section are large and could easily be discarded in quarrying or crushed for concrete aggregate. In the hill just above the outcrop is an opening in the Alma Coal (No. 630 on Map II) that could be utilized for fuel absolutely free of freight or hauling charges other than the cost of mining. The Chesapeake and Ohio Railway, just across the Guyandot River, furnishes a ready means of transportation, and the towns in the great mining region, of which Logan is the center, would provide a splendid local market.

At Peach Creek Station, at the mouth of Crooked Creek, Logan District, Logan County, the following measurement of Eagle Shale was made by Reger on the land of **Scott McDonald:**

		Feet.
1.	Sandstone, massive, Grapevine	15
2.	Shale, dark with streaks of iron, to railroad grade (670′ B.)	10

A sample (No. 23R) was collected from No. 2 of section, the analysis of which is as follows, according to Hite and Krak:

	Per Cent.
Silica (SiO_2)	57.06
Ferric Iron (Fe_2O_3)	6.66
Alumina (Al_2O_3)	19.56
Lime (CaO)	1.20
Magnesia (MgO)	1.99
Sodium (Na_2O)	0.50
Potassium (K_2O)	3.88
Titanium (TiO_2)	0.53
Phosphoric Acid (P_2O_5)	0.34
Moisture	0.94
Loss on Ignition	6.92
Total	99.58

This exposure, like that at Crawley Creek, would be favorable for brick making. The entire thickness of the shale could not be measured, as it was partly under drainage, but it could easily be mined, because the Grapevine Sandstone forms a roof above it, and the outcrop is along the Chesapeake and Ohio Railway, thus minimizing the cost of a siding. Coal is available at Mines Nos. 35 and 124 on Map II, one-half mile up Crooked Creek.

At the old stone quarry on the south side of Crooked Creek, the Eagle Shale is just above drainage, while above the Grapevine Sandstone is another shale bed 6 feet thick and of a yellowish color, as shown by the section for Hughey, published in Chapter VI.

Samples from both of these shales were once sent by Scott McDonald to the Chicago Brick Machinery Co., of Chicago, Illinois, for experimental purposes. The Survey is in possession of a sample of the pressed brick made from each stratum, as furnished by Mr. McDonald. The yellow shale burned to a pale red color, while the dark Eagle Shale burned to a very dark red, due to the presence of iron. On fracture, the brick appeared to be tough and durable.

In Mingo County, the Eagle Shale comes above drainage along Tug Fork between Thacker and the mouth of Grapevine Creek, and remains above the river all the way to the McDowell County Line. According to Hennen, the shale is usually 30 to 40 feet thick and frequently carries limestone concretions and nuggets of iron ore. There is an abundance of fuel for burning brick and markets and transportation are available along the Norfolk and Western Railway, so that brick making from the Eagle Shale in this region should prove successful. The outcrop may be readily traced from the Lower War Eagle Coal, which underlies this shale by an interval of 20 to 40 feet, and the outcrop of which is shown on Map II.

At the south side of Grapevine Creek, along the Norfolk and Western Railway, one mile southward from Thacker, the following measurement was made by Gawthrop:

				Feet	Inches
1.	Sandstone, massive, Grapevine			30	0
2.	Shale, reddish brown, with iron ore nodules	5'	Eagle Shale	10	0
3.	Shale, bluish gray	3			
4.	Shale, dark gray, to railroad grade (720' B.)	2			

A sample (No. 23G) was collected from Nos. 2, 3 and 4 of section, the analysis of which is as follows, according to Hite and Krak:

	Per cent.
Silica (SiO_2)	53.48
Ferric Iron (Fe_2O_3)	7.61
Alumina (Al_2O_3)	22.09
Lime (CaO)	0.88
Magnesia (MgO)	1.47
Sodium (Na_2O)	0.70
Potassium (K_2O)	4.52
Titanium (TiO_2)	0.42
Phosphoric Acid (P_2O_5)	0.32
Moisture	2.23
Loss on Ignition	6.46
Total	100.18

There is every reason to believe that brick making in this region would be successful and profitable.

Fire Clay.

The Kanawha Series, which forms the surface rocks in Logan and Mingo, does not carry fire clays of commercial thickness and purity. No flint clay, except a 2 to 3 inch parting in the Chilton Coal on Dingess Run and Huff Creek, was observed, and the deposits of plastic clay are too thin or too sandy to be of any value for brick making or for the miscellaneous uses for which fire clay is adapted.

ROAD MATERIAL.

River and Creek Gravel.

Attention has been called, in many previous County Reports of the Survey, to the fact that one of the cheapest and most convenient kinds of road material available in West Virginia is the vast amount of gravel in the beds of the rivers and smaller streams. Logan and Mingo Counties are not exceptional in this respect. Most of the creeks carry a large amount of gravel, the remains of the hardest part of the rock ledges from which it comes, and therefore the most durable portion, which can be placed on the roads at a minimum cost, as most of them follow the streams closely. By using this gravel for improving muddy sections of roads, a large part of the expense incident to such work may be avoided.

Brick.

The use of brick for improving country roads has lately been tried in some of the more populous counties of the State with good results. In Logan and Mingo, as outlined above, under "Stratified Shales," there is enough good material to provide all the brick that may be needed for improving the main highways. Plants should be established at various points in the two counties where convict labor could be used to advantage and where cheap fuel could be obta freight charges on material practically to possible to improve the main thoroughfares

BUILDING STONE.

Quarries.

In Chapter VI, the sandstone quarries have been described under their respective The following table gives a list of such as and previously described, with page referenc description:

Table of Sandstone Quarri

Name of Sandstone.	Location of Quarry.
Brownstown	Logan, ½ mile north of..
Cedar Grove, Lower....	Monitor, ¼ mile south
Cedar Grove, Upper...	Holden, west edge......
Cedar Grove, Upper...	Holden, 1 mile west of..
Chilton, Upper.........	Naugatuck, ¼ mile nort
Eagle	Chapmanville ....
Gilbert, Upper.........	Cedar Station, 300 feet w
Grapevine	Peach Creek Station....
Homewood	Dingess, ½ mile west of
Logan	Logan, east edge.......
Logan	Logan, 1 mile east of....
Logan	Whitman Junction......
Logan	Monitor ....
Matewan	Matewan, east edge of..
Peerless	Logan, 1 mile west of...

Available Stone.

The sandstones of the Kanawha Ser Mingo are nearly all of the same general t micaceous, medium hard, medium coarse, bedded. Most of them are well suited for such as bridge piers, retaining walls, and they are not adapted for ornamental work, the texture to make them beautiful or the of carved stone. Their use will be local on to develop commercial quarries to compete kets would likely end in financial failure.

WATER POWER.

Available Streams.

No attempt has ever been made to utilize the streams of Logan and Mingo for the development of water power on a commercial basis. The only streams worthy of attention are the Guyandot River in Logan and Tug Fork of Big Sandy River in Mingo. Hydro-electric power plants would be possible along either of these rivers, but conditions are not ideal. No gaging records are available along either river, but it is certain that the run-off in the winter and spring is large, while in the summer and fall it is correspondingly small, making it necessary to build enormous storage reservoirs to equalize the flow at the power plants. An additional drawback is the fact that along almost the entire length of both streams in the territory of this Report, there are numerous valuable coal seams often near the present water level, in many of which mining operations are now being actively conducted. If storage reservoirs should be built, the damage done to the plants now in operation or to the flooding of coal seams now held for reserve fuel would be so great that the cost of condemnation would be prohibitive. An additional drawback would be the lack of convenient markets, without which such projects are unsuccessful.

The following table, showing indicated horsepower developed by streams passing through Logan and Mingo Counties is compiled from tables 19 and 20, pages 428 and 430 of the Semi-Centennial History of West Virginia, by Dr. J. M. Callahan, the tables in question being part of a special article on "Water Power Resources" by A. H. Horton, District Engineer, Water Resources Branch, U. S. Geological Survey:

Indicated Horsepower Developed by Streams Passing Through Logan and Mingo Counties.

Stream.	From.	Section.	Length, Miles.	Mean Drainage Area. Square Miles.	Minimum Discharge. Sec.-Ft.	Assumed Discharge for Maximum Development. Sec.-Ft.	Total Fall. Feet.	Minimum Horse-power.	Assumed Maximum Development. Horsepower.
Tug Fork.	Source.	Above Dry Fork.	32	a270	23	97	2,100	1,112	4,680
do	Below Dry Fork.	Above Knox Creek.	18	525	45	190	200	828	3,500
do	Below Knox Creek.	Warfield.	36	970	58	323	200	1,070	5,940
Big Sandy.	At Louisa.		..	a3,780	132	1,260	17	206	1,970
do	At Cavanaugh.		..	a4,080	143	1,360	12½	164	1,560
do	At Catlettsburg.		..	a4,140	145	1,380	12	160	1,520
Dry Fork.	Source.	Mouth.	27	a180	16	65	2,100	772	3,140
Pigeon Creek.	Source.	Mouth.	30	a147	13	53	1,400	418	1,710

MINERAL WATERS.

Medicinal Springs.

No medicinal springs have been exploited within the two counties, and, so far as known, none exist. There are numerous small red sulphur springs along many of the creeks which probably derive their sulphur content from the coal seams, but none of them appears to have the necessary volume to be worthy of tests.

FORESTS.

Logan County.

In Volume V, pages 180-182, of the State Survey Reports, by A. B. Brooks, State Forester, there is a description of the forests of Logan County that is of such pertinent interest that most of it is here republished, as follows:

"The Original Forests.

"The original hardwood forests of the County were equal in stand and quality to those of any other section of the State. It is doubtful, indeed, if black walnut trees of such unusual size and perfection could have been found anywhere else in West Virginia. J. M. Anderson cut a figured walnut which is said to have measured 7 feet in diameter and 80 feet to the first limb. It is stated that figured trees were common and that many were cut which equaled, or nearly equaled, in size the one mentioned above. The growth of yellow poplars, also, was almost phenomenal. A reliable citizen of Logan asserts that he saw and obtained measurements of a tree of this species 12 feet in diameter and with a long trunk which tapered evenly and moderately to the crown.

"Below are given the approximate percentages of timber trees growing on two virgin tracts lying on opposite sides of the county:

"The stand on a 13,000 acre tract on Buffalo Creek is as follows:

"Yellow Poplar	60 per cent.
"White Ash	
"Cucumber	15 per cent.
"Basswood	
"Oaks	
"Hemlock	
"Chestnut	25 per cent.
"Hickory	
"Beech and others	

"The stand on a 13,000 acre tract on Guyandot River and Rich Creek is as follows:

"Oaks (principally White Oak)	50 per cent.
"Yellow Poplar	
"Cucumber	25 per cent.
"Basswood	
"Hickory	
"Chestnut	
"Maples	
"Beech	25 per cent.
"Birch	
"Locust	
"Hemlock and others	

"Hemlock, pitch pine and red cedar were the only softwoods. Cedars were not uncommon along the water courses and pitch pines were occasionally seen growing on dry ridges. Hemlock was more or less common in the stream channels of the eastern part of the county, but rare in the western part."

"The Present Forest Conditions.

"Logan County is divided into 3 magisterial districts—Chapmanville, farthest north; Triadelphia, farthest south; and Logan, in the middle. Chapmanville is a district of farms with about 5 per cent. of the land owned by non-residents. In this district, however, the land is rough and less than half cleared. About 70 per cent. of Logan District is owned by non-residents, and about 30 per cent. of Triadelphia. The farm lands in the two districts last named are largely restricted to the narrow bottoms and the hillsides along the principal streams. About 10 per cent. of the county is cleared, and, altogether, 121,160 acres may be classed as farm and woodlot land. The remaining 195,000 acres are in forest. Of this, 35,000 acres are in virgin forest and 160,000 acres are in cut-over forest. The principal virgin areas lie toward the eastern end of the county on Buffalo Creek and on Rich Creek and Guyandot River. Smaller tracts lie near the Mingo Line and on the river a few miles north of the town of Logan. There is a stand of timber on these tracts of about 12,000 feet per acre of the species mentioned above under another head. The large areas of cut-over land, found through the central and eastern sections, contain, in some places, a good stand of the less valuable timbers. Much of the cut-over land on the northeast side of Guyandot River has a fair stand of excellent oak. This is particularly true of the territory south of Big Huff Creek and between Big Huff and Buffalo Creeks."

Areas Suitable for Reforestation.

A large part of Logan County, probably 90 per cent., consists of steep precipitous hill land that is too rock and rough to be available for agricultural purposes, narrow strips along the creeks, only, being suitable for such use. This condition leaves large areas of land that become non-productive unless they can be made to produce timber. The description quoted above from Volume V shows that Logan County once contained timber hardly excelled in value by that of any other part of the world. Since a considerable part of the county is owned by large coal and lumber companies, the problem of reforestation is comparatively simple. A force of forest rangers could be employed, under a cooperative arrangement, with assessments on the companies, based on the amount of land owned by each, that would look after the protection of young timber from forest fires, supervising the planting of new trees when necessary, and direct the cutting of the mature timber at stated intervals. Such a policy would not only secure a handsome return from what is now waste land, but would also aid in flood prevention and preserve the summer water supply, which would soon fail if the hillside should be denuded.

Mingo County.

In Volume V, pages 203-205, of the State Survey Reports, there is a description of the forests of Mingo County, some portions of which are here republished in the following paragraphs:

"The Original Forests.

"That part of Logan County which is now Mingo was once heavily timbered with hardwoods. Just as in many other counties of the State, white oak and yellow poplar were the most abundant of the valuable species. The less abundant valuable timber trees were black walnut, basswood, chestnut, red oak, black oak, chestnut oak, hickory, sugar and red maple, yellow and sweet birch, sycamore, sweet buckeye, white elm, slippery elm, hemlock, and others. Softwoods were not plentiful in any section. Hemlock grew sparingly along the streams and a few pitch pines on the dry ridges."

"The Present Forest Conditions.

"There are, approximately, 8,200 acres of virgin forest in the county. Two thousand acres of this lies near the head of Browns Fork of Guyandot, 1,500 acres lies on waters of Pigeon Creek, and the remainder on waters of Twelvepole Creek. The land owned and occupied by native settlers lies principally in narrow strips along the water courses. Not over 5 per cent. of the land in the county is cleared and not over 35 or 40 per cent. is held in fee by resident owners. There are about 200,000 acres of cut-over forest land owned by coal companies and other non-residents.

"The virgin forest areas have a remarkably good stand of hardwoods, and a large percentage of the cut-over land has some merchantable timber left. None of the hickory, beech, birch and maple has been cut, and in some sections, as on Marrowbone Creek, Trace and Elk Forks of Pigeon Creek, Left Fork of Twelvepole Creek and in the region east of Guyandot River, there is a fair stand of medium and small white oaks, yellow poplars, and others, of the more valuable kinds of timber. It may be said of the forest land that 50 per cent. has a varying stand of timber 18 inches and under; 25 per cent. has a stand of 12 inches and under; 15 per cent. has a stand of 20 inches and under; and 10 per cent. has a stand of 24 inches and under. The cut-over areas will estimate about 2,000 feet per acre of all species.

"Except in coal mining sections and in parts frequently visited by forest fires, the cut-over lands are in prime condition and the young timber is making a rapid and healthy growth."

Areas Suitable for Reforestation.

The topography of Mingo County is similar to that of Logan, being too rocky and rough for farming, except along the valleys. The paragraphs quoted above show that conditions are favorable to the reproduction of the timber, and most of the land is owned by large companies, so that the plan of reforestation outlined for Logan County could be employed in Mingo with profit both to the companies and to the general public.

PART IV.

Paleontology.

CHAPTER X.

NOTES ON THE PALEONTOLOGY OF LOGAN AND MINGO COUNTIES.

By W. Armstrong Price.

INTRODUCTION.

The following preliminary report on the invertebrate fossils of Logan and Mingo Counties contains a brief description of the faunal horizons known to outcrop in the area, and a very general survey of the fossil shells found therein. The field work consisted of short visits paid to localities where fossils were reported by other members of the Survey as most accessible. The collecting was done by the author during the Fall and Winter of 1913, a few localities being visited in the Fall of 1914. Small collections were also made by Messrs. Hennen, Reger and Gawthrop. Fossil lists given herein are only very partial and compiled largely from field notes, as the collections have not been studied in the laboratory; they are therefore subject to revision. It is the purpose of the writer to give a detailed account of these fossils in a later report. Some twenty localities have been visited and collections made from them which should give a fair idea of the ancient life of the three basins of deposition in which the strata of the three fossiliferous beds found in the area were formed. The correlation of these beds as determined by the authors of the previous Chapters of this Report, is based on lithology; that is, the tracing of prominent strata such as

minable coal beds, cliff-forming sandston
beds, and not on the fossil content of the fa
has not as yet been studied sufficiently to
relation by this latter means. It is, ther
quite variable character of even the most p
in the area and to the rapid thickening o
southeast direction (due to their lentic
probable delta origin) not improbable that
may be necessitated by a close comparison
is the opinion of Hennen, as stated on a p
the more probable, as the fossils were not
the field work had been completed.

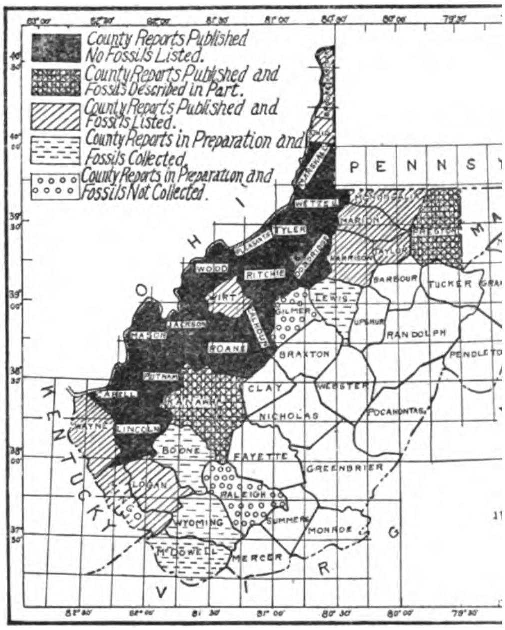

Figure 23. See explanation on

FAUNAL HORIZONS

Invertebrate fossils have been discove
of the Kanawha Series in Logan an
These horizons are, beginning with the o

Dingess and the Buffalo Creek Limestones. Horizons known to carry fossils in adjoining counties, both in the Kanawha Series and in higher measures, outcrop in the area, but no fossils have been found in them. These beds, with the exception of the Kanawha Black Flint, were not well known at the time the field work on the area was being done and it is possible that fossils may yet be found in them. The Black Flint is shaly and non-fossiliferous where examined in Logan and Mingo by the Survey Staff. However, the fossiliferous beds of the Kanawha Series are not so constant in character as are those of prevailingly marine formations, and it would not be surprising if during some periods sea life did not penetrate to this area, although profuse in regions not far distant.

The fossiliferous beds above have been described by Hennen and Reger on pages 211-215, 165-6, and 143, respectively. Of these the Eagle horizon is the most persistent and uniform in character, while the Dingess is less so and is more difficult to trace on account of its sandy composition in a formation in which sandstones and sandy shales predominate. The Buffalo Creek Limestone is known from only a few localities, and may be the equivalent of the Winifrede Limestone of Kanawha County.

The following table presents the three beds in their relative positions, with distances below the top of the Homewood Sandstone:

	Thickness. Feet.	Distance. Feet.
Sandstone, **Homewood**................	75 to 100	100
Limestone, **Buffalo Creek**, fossiliferous	0 to 2	427
Limestone, **Dingess**, fossiliferous.....	0 to 2	762
Shale, **Eagle**, fossiliferous............	15 to 20	1564
Limestone, **Eagle**, fossiliferous.......	0 to 2	1566
Shale, **Eagle**, fossiliferous...........	10 to 25	1591

The relation of the above beds to the other members of the Kanawha Series is given on pages 101-104 in the general section for this series. In the descriptions of formations by Hennen and Reger cited above, incomplete lists of genera are given. The following list is more ample, but by no means gives a fair idea of the faunas. In most cases the species, and in some the genus, is in doubt, and the name given is that of the form which it most nearly resembles among those already found in the Pennsylvanian of West Virginia. In the former case the name of the species is preceded by "cf." Most of the fossils represented in this list are either new species or forms not previously found in the Pennsylvanian of the State by the author:

Preliminary List of Fossils from Logan and Mingo Counties, as Determined in the Field and from a Cursory Examination of a Few Collections.

Fossils.	Marine Horizons.		
	Buffalo Creek.	Dingess.	Eagle.
Lingula umbonata	—	x	x
Orbiculoidea capuliformis?	x	x	—
Orbiculoidea cf. missouriensis	—	—	x
Derbya robusta?	x	—	—
Derbya cf. crassa	—	x	—
Chonetes cf. granulifer	x	—	x
Productus cf. punctatus	—	x	—
Productus cf. semireticulatus	x	x	—
Productus cf. symmetricus	x	—	—
Productus sp. (gibbous)	—	x	—
Productus cf. cora	x	x	—
Marginifera cf. wabashensis?	x	x	—
Spirifer boonensis	x	x	—
Composita sp. ?	—	x	—
Solenopsis solenoides	—	—	x
Edmondia cf. subtruncata	—	—	x
Nucula parva	—	x	—
Nucula sp	—	x	x
Anthraconeilo sp. ?	—	x	—
Leda sp	—	x	x
Leda sp. arata	—	—	x
Myalina sp	—	x	—
Aviculipecten cf. occidentalis	x	x	x
Allerisma sp	—	x	x
Allerisma cf. terminale	—	x	—
Pleurophorus sp	—	—	x
Astartella sp. ?	—	—	x
Bellerophon cf. crassus	—	—	x
Euphemus carbonarius	—	—	x
Pharkidonotus percarinatus?	—	x	—
Phanerotrema grayvillense ??	—	—	x
Conularia crustula?	—	x	—
Crinoidea (stem)	—	x	—
Ostracoda	—	x	—
Pisces (tooth)	—	x	—
Fossil worm? in Naugatuck Sandstone.			

Register of Localities.

The following list includes all the localities in the county from which fossils have been collected by the writer, together with the name of the fossiliferous bed outcropping at each locality:

49. Mingo County, Hardee District. N & W. Ry. cut, 1.3 miles south-
50. east of bridge over Pigeon Creek at Naugatuck. Dingess Limestone.
51. Mingo County, Hardee District. N. & W. Ry. cut 1.9 miles south-
52. east of Naugatuck at Maher, 28 to 29 feet above railroad grade. Dingess Limestone.
53. Mingo County, Hardee District, N. & W. Ry. cut 1.9 miles southeast of Naugatuck at Maher, 36 feet above railroad grade. Dingess Shale.
54. Mingo County, Harvey District, bed of Twelvepole Creek, 1.1 miles southeast of Dingess, 1005′ B.; Dingess Limestone. Type locality.
55. Mingo County, Hardee District, Right Fork of Laurel Fork of Pigeon Creek, 0.6 mile southeast of Rapp, in bed of stream. Dingess Limestone.
56a. Mingo County, Hardee District, Bearpen Branch of Laurel Fork of Pigeon Creek, 1.6 miles west of Canterbury. Dingess Limestone.
56b. Mingo County, Hardee District,. Coal Spring Branch of Laurel Fork of Pigeon Creek, 0.5 mile north of Canterbury, in bed of stream. Dingess Limestone.
74. Logan County, Triadelphia District, 0.8 mile west of mouth of Sandlick Branch of Huff Creek, and near Cyclone; 830′ B. Eagle Shale.
84. Mingo County, Stafford District, 0.25 mile north of mouth of Fourpole Creek of Tug Fork of Big Sandy River. Hillside at 1280′ B. Eagle Limestone.
87. Mingo County, Magnolia District, N. & W. Ry. cut, 0.5 mile east
88. of Delorme at railroad bridge over Tug Fork to Freeburn Colliery. 755′ L. Eagle Shale.
115. Logan County, Logan District, 1525′ B., in left hand hollow, 0.6 mile below mouth of Conley Branch of Island Creek and 0.5 mile from mouth of hollow. (2 miles southeast of Oilville.) Buffalo Creek Limestone.
116. Mingo County, Lee District, 0.6 mile northeast of Rawl on point between Dick Williamson and Murphy Branches of Tug Fork of Big Sandy River. 1395′ B. Buffalo Creek Limestone.
117. Mingo County, Lee District, Hillside south of Williamson Creek, coal mine of Superior Thacker Coal Co., 0.25 mile east of mouth of creek. Dingess Limestone.
118. Buchanan County, Virginia, Rock Lick District, ridge opposite mouth of Turkey Creek at War Eagle, Mingo County, Stafford District, West Virginia, 0.3 mile west of mouth of creek; 1275′ B. Eagle Shale.
119. Mingo County, Magnolia District, 0.5 mile northwest of mouth of Mate Creek at Matewan. 1205′ B. Hillside north of Matewan. Dingess Limestone.

120. Mingo County, Triadelphia District, east hillside above public road; 810′ B.; Eagle Shale.

121. Mingo County, Stafford District, ridge ea on N. & W. Ry., 1055′ B., over the mile northwest of the Junction. Ea

APPENDIX "A."

LEVELS ABOVE MEAN TIDE.

Guyandot Valley Branch of Chesapeake & Ohio Railway.

Miles from Barboursville.	Station.	County.	Elevation.
50.1	Big Creek	Logan	640
51.4	Kitchen	"	...
54.2	Chapmanville	"	653
58.6	Pecks Mill	"	665
63.3	Peach Creek	"	...
65.2	Logan	"	687
70.4	Ethel	"	...

Main Line, Norfolk & Western Railway.

Distance from Norfolk.	Station.	County.	Elevation.
434.0	Alnwich	Mingo	897
437.88	Wharncliffe	"	826
439.80	Glen Alum	"	806
442.78	Lindsay	"	778
446.59	Devon	"	754
450.87	Sands	"	732
453.73	Delorme	"	720
456.21	Thacker	"	711
460.70	Matewan	"	692
465.80	Rawl	"	673
469.59	Williamson	"	660
473.42	Barger	"	651
477.63	Nolan	"	645
484.40	Naugatuck	"	630
488.70	Lenore	"	635
492.01	Canterbury	"	675
496.53	Hale	"	880
498.85	Dingess	"	1001
501.11	Trace	"	915
507.27	Breeden	"	811

Big Sandy Line of Norfolk & Western Railway.

Distance from Norfolk.	Station.	County.	Elevation.
484.35	Naugatuck	Mingo	630
489.59	Kermit	"	623

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